TELECOMMUNICATIONS POLICY & PLAN

FOR

THE CITY OF ROCKVILLE

Approved:
March 8, 1999

Prepared By:

River Oaks Communications Corporation

TABLE OF CONTENTS

Executive Summary

Telecommunications development emerged as one of the community's priority concerns for the future of the City of Rockville, Maryland ("City") through "Imagine Rockville," the community visioning process. Shortly after the most recent municipal election, the Mayor and Council conducted a retreat and designated the development of a Telecommunications Policy and Plan for the City as one of their four priority policy initiatives for the current term.

Funding was made available to hire a consultant, and the Technology Action Team, one of the "Imagine Rockville" citizen action groups, along with staff, developed a Request for Proposals (RFP). The scope of services included:

- An assessment of laws and regulations
- An assessment of existing telecommunications service providers and facilities in Rockville
- An assessment of the City's existing telecommunications systems and facilities
- An assessment of possible alternatives for the City of Rockville
- An assessment, analysis, and forecast of telecommunications trends
- An assessment of the City's process dealing with the entry and development of telecommunications services
- A public information dissemination and public information obtainment process

In response to the RFP, the City received proposals from ten firms, including some of the most highly regarded in the field of municipal telecommunications consulting. After a thorough review of the proposals, the Technology Action Team and staff recommended that the Mayor and Council accept the proposal of River Oaks Communications Corporation ("River Oaks") and award a contract. The Mayor and Council agreed and awarded the contract.

Since June of 1998, River Oaks has been conducting a study and analysis with input from the Technology Action Team, other Rockville residents, businesses, the Mayor and Council, the Planning Commission, staff, and technical and legal subcontractors with expertise in telecommunications.

The public was kept apprised of the nature, scope, and direction of the project through articles in the City's monthly newsletter, "Rockville Reports"; through a public forum that was televised live and replayed several times on the City's cable television station; through other programs, news stories, and bulletin board announcements on the City's cable television station; through information on the City's Web site; and through news releases.

A very important part of the information gathering was a residential survey that was mailed in "Rockville Reports" to every address in Rockville. More than 1,400 completed surveys were returned by the deadline.

A separate survey was mailed to Rockville businesses, and a business focus group was conducted.

Since part of the project involved an assessment of the City government telecommunications systems and services, a third survey was distributed to City department heads. River Oaks also conducted in-person interviews and site visits.

Partway through the study, the consultants met with the Mayor and Council in work session to brief them and to receive direction.

In early January 1999, River Oaks presented a draft Proposed Telecommunications Policy and Plan to the Technology Action Team and to the Planning Commission. Comments, suggestions, and questions from those two groups were incorporated in the drafting of the Proposed Telecommunications Policy and Plan that was presented to the Mayor and Council on January 25, 1999.

The complete document was posted on the City's website; copies were distributed to the Technology Action Team; and a review copy was placed at the Rockville public library. In *Rockville Reports* and on Rockville Cable 53, the City announced where complete copies were available. Additionally, some people picked up copies at the January 25 meeting. Copies of the policy and plan sections were made available at the January 25 meeting and at City Hall after the meeting.

At the January 25th meeting, Council members Marrinan and Harrison raised as areas of concern, the privacy and integrity of information provided electronically, and a privacy statement for the City's website. Those matters have been addressed by new language proposed and reviewed by City staff, River Oaks, and the City's Legal Department, and discussed with Mayor and Council in Work Session on March 1, 1999.

The final Telecommunications Policy and Plan was approved on March 8, 1999 and consists of the following:

- Policy—Issue statements followed by policies
- Plan—Each policy statement followed by action steps for implementation
- Appendices—detailed supporting material, recommendations and options

TELECOMMUNICATIONS POLICY
FOR THE CITY OF ROCKVILLE, MARYLAND
Policy Issues and Statements

Introduction

Since the early 1980's, the pace of development of telecommunications infrastructure and services has been staggering. This the result of many factors, among them: the break up of AT&T in 1984 into a number of regional telephone companies and the ensuing competition in the long distance market; the deployment of broadband technologies in major markets by cable television companies; the evolution of competitors in the telecommunications services marketplace from Alternative Local Telecommunications (ALT) Providers and Competitive Access Providers (CAPs) into Competitive Local Exchange Carriers (CLECs) and the associated infrastructure development that continues to be required; the development of Personal Communications Services (PCS) and the significant new wireless tower and antenna deployment that has been required; the rapid advancement in telecommunications technologies and services for both the business and residential marketplace; and landmark regulatory initiatives, especially the Federal Telecommunications Act of 1996 ("the Act").

All of this has created both opportunities and challenges for local governments. The opportunities come in the form of access to higher quality, higher capability, lower cost telecommunications technologies and services which can help enhance economic development, increase the efficiency and effectiveness of services delivered by local government, and provide overall benefits to the citizenry both at home and at their workplaces. The challenges come in the form of a significant increase in infrastructure and an ever-increasing impact on the public Right-Of-Way (ROW) that require careful and thoughtful responses by the local government, weighing the needs and interests of all the affected parties, while dealing with constraints at both the State and Federal levels.

Accordingly, the City of Rockville, Maryland ("City"), like many other jurisdictions, determined that the most appropriate way to approach both the challenges and opportunities presented in the current and anticipated telecommunications climate is to develop a Telecommunications Policy and Plan which addresses all the pertinent issues that confront the City. This Telecommunications Policy and Plan initiative is a priority of the Mayor and Council and was previously identified as a priority by the Rockville community during the visioning process.

The Policy and Plan detailed in this document is a collective effort, which includes input from citizens, the Mayor and Council, businesses, City staff, the Technology Action Team (a citizen advisory group), the Planning Commission, and the City's telecommunications consultant, River Oaks Communications Corporation ("River Oaks").

Supporting Study Methodology

In the course of assisting the City in the development of its Telecommunications Policy and Plan, River Oaks performed a supporting study to review a number of issues ultimately addressed by the policy statements below and, during the review process, to obtain input from a variety of Communities of Interest ("Communities"). The study began in June 1998 and concluded in December of 1998. It was designed to gather, review, and analyze information in both a qualitative and quantitative manner regarding the following project elements:

- An assessment of legislative, regulatory and other legal factors that affect telecommunications planning and policy development in Rockville.
- An assessment of the external telecommunications service providers and facilities climate in Rockville.
- An assessment of the City's internal telecommunications service and facilities environment, including alternatives for the future.
- An assessment of synergies between the City and Montgomery County regarding telecommunications matters.
- An assessment, forecast and impact analysis of telecommunications developments and trends.
- An assessment of the existing City process concerning the entry and development of telecommunications services in Rockville.
- A public process to both inform and obtain input from the community about issues regarding telecommunications.

The public process constituted one of the most intensive components of the study. Specifically, information concerning telecommunications issues was disseminated in a variety of forms including news releases, features in the City's newsletter, *Rockville Reports*, and programs on the City's cable television channel. A public forum was held in late September to provide information and answer citizen questions. The forum was televised live and rebroadcast a number of times. After this, a wealth of information was gathered through a broad-based survey of residents and businesses as well as through a business focus group and personal interviews. These resulted in the reports found as Appendix 10 (Residential Telecommunications Needs Assessment Report) and Appendix 11 (Business Community Telecommunications Needs Assessment Report). Public information efforts continued throughout the study period with articles in *Rockville Reports* and programs on the City's cable channel.

The results of the study and the collective efforts of those individuals and groups described above, have resulted in the Policy Statements detailed herein and the Action Steps listed in the Telecommunications Plan. The successful implementation of the Policy and Plan also will need to be a coordinated team effort, including roles and responsibilities for all of the individuals and groups described above.

Policy Issues and Statements

1. **Compliance with, and Affect on, Federal Laws and Regulations.** The provision of enhanced telecommunications services will have a significant bearing upon the quality of life for Rockville residents and businesses. The deployment of such services, and the City's activities related to deployment, are in a number of cases guided and affected by federal parameters, specifically those emanating from the Act. These parameters include a focus on encouraging competition and eliminating barriers to entry, and provisions concerning management of the public ROW for the benefit of all users and the receipt of fair and reasonable compensation for its use.

Policy Statement: *The City supports efforts which advocate the roll-out of telecommunications services on a competitively neutral and non-discriminatory basis. In this regard, the City will apply federal laws and regulations in a fair and impartial manner while continuing to preserve local authority.*

2. **Compliance with, and Affect on, State Laws and Regulations.** The City has authority from the State regarding the implementation and enforcement of permitting provisions for users of the ROW and regarding the franchising of the providers of cable and other video services. The City may have constraints, based on 1954 State law, regarding the receipt of equivalent fees as compensation for use of the ROW from the providers of telecommunications services.

Policy Statement: *The City will continue to use current enablements given under State law to receive compensation for the use of the ROW, including seeking the recovery of all costs incurred by the City related to ROW use by commercial providers. Where necessary and appropriate to change State law to enable the City to receive more fair, reasonable and equivalent compensation from all users of the ROW, and in so doing help level the playing field and benefit the citizens of Rockville, the City supports efforts that advocate such change to State law. The City may work proactively with other local governments and allied entities on initiatives to change State law in this regard.*

3. **Encouragement of Competition.** Where true competition has emerged in the telecommunications marketplace it has proven to both lower costs and expand service options. Citizens have indicated a large interest in seeing an expansion of competition at the local level, especially to reduce cost, while improving the viability of service options such as telecommuting. Rockville businesses also are looking to reduce service costs, including through packaged services that help streamline billing, while enhancing the availability of redundant services to increase reliability.

Policy Statement: *While continuing to appropriately manage the use of the public right-of-way, the City will encourage and promote competition in the local telecommunications marketplace. It will use all avenues open to it, to pursue an increase in the number and diversity of telecommunications services available in Rockville, including advocacy of beneficial initiatives at the State and Federal levels. It will make Rockville citizens*

aware of its efforts to promote competition through public reporting mechanisms, including electronic means such as the City's website.

4. **Proactive Management of the Public Right-Of-Way (ROW).** There are a number of facilities–based telecommunications service providers in and impacting the ROW in Rockville. There are others already indicating a desire to utilize the ROW. With both citizens and businesses in Rockville indicating a keen interest in expanded telecommunications service competition, the possibility is high that the number of providers will continue to grow. As this is occurring, there is evidence that the City is not currently fully recovering its costs related to the ROW permitting process. Additionally, while the current process effectively addresses a number of permitting areas, beneficial potential enhancements to the current process have been noted that could be made to benefit service providers, citizens and City government oversight functions alike.

Policy Statement: *The City will continue to proactively manage the ROW. As part of this management function, the City will seek to enhance its permitting provisions and develop a comprehensive set of provisions that apply to all providers, as allowed by State and Federal law. These provisions will include measures to ensure that citizens do not subsidize private infrastructure development, by guaranteeing that the City is reimbursed for all of its direct and impact costs concerning the use of the ROW by commercial providers.*

5. **Personal Wireless Communications Services.** The applications and uses of Personal Wireless Communications Services continue to grow at exponential rates. So too does the need for additional wireless tower, antenna and associated infrastructure. Multiple providers are enabled under Federal spectrum auctions to serve the City. Applications include voice, video and data products and services. While customers want these services, they are, at the same time, concerned about infrastructure location and aesthetic impact. Federal law both empowers and places obligations on the City regarding wireless facilities placement regulations.

Policy Statement: *The City supports and encourages the roll-out of Personal Wireless Service facilities, while at the same time, retaining and enhancing its local zoning authority and its sensitivity to local concerns. Supplementing the existing zoning standards will continue to safeguard the public health, safety and welfare of Rockville residents, continue to treat functionally equivalent telecommunications services in an equitable manner and further manage public property and the public right-of-way which is held in trust for Rockville citizenry.*

6. **Internal Telecommunications System Development.** The City is currently working hard to integrate and use telecommunications technology and services to enhance internal efficiency and the external provision of government services. The City already is reviewing needed enhancements to internal systems and is in the midst of a reorganization establishing an Information Technology Department that will manage a variety of communications functions. Currently, City internal telecommunications

systems and services are in need of advancement and a number of beneficial potential enhancements have been noted. The City has, and will have, access through franchise and other agreements to worthwhile Institutional Network infrastructure.

Policy Statement: *The City will continue to advance and develop its internal telecommunications systems for the benefit of its citizens. Such advancements lead to more efficient government operations, more accessible government services and a more informed citizenry. The City will use a combination of expanded or improved internal infrastructure, equipment and other resources, as well as continued outsourcing of some support functions, taking into account the best cost versus benefit analysis, to expand its provision of information electronically, and heighten its video, voice, and data communications connectivity, capacity and capabilities.*

7. **Synergies With Montgomery County.** The City currently finds some synergies and efficiencies in certain relationships with Montgomery County including: administration of cable television and potentially Open Video Systems regulatory activities; delivery of police emergency services; use, and advanced development, of public safety communications; access to Internet services; and development and maintenance of a Geographical Information System (GIS). With these synergies and efficiencies, also comes some constraints such as delays in accessing or implementing certain systems or services.

Policy Statement: *The City will continue synergistic and efficient relationships with Montgomery County that provide significant and cost effective resources to the City for the benefit of its citizens. Where delays or other problems occur as part of the current relationships or agreements with the County, the City will review other options or the restructuring of current relationships and implement changes to eliminate delays and resolve problems.*

8. **Monitoring and Integration of New Telecommunications Technology and Services.** The pace of change related to telecommunications technology and services is exceedingly fast for both wireline and wireless based services. This means continual developments in infrastructure and service deployment. These changes will both enhance and impact the City's use of, and reaction to, the implementation of telecommunications infrastructure and services at the local level. At the present time, for example, increased deployment of fiber optics cabling, wireless service towers and antenna and new communications alternatives for homes and businesses such as Digital Subscriber Line services (DSL), all affect the local telecommunications environment and require monitoring and reaction by the City.

Policy Statement: *The City will continue to monitor the development of new telecommunications technology and services and integrate them where appropriate to increase service levels and operational efficiencies and reduce costs. The City also will react and respond, in accordance with its Telecommunications Policy and Plan, to new telecommunications technologies and services that have an impact on the ROW or other public property. The City also will encourage the development and deployment of new*

telecommunications technologies and services that enhance the competitive service climate for Rockville's citizens, businesses, government, and other organizations and institutions.

9. **Continued Focus on Citizen Input, Involvement and Interests.** Rockville citizens are clearly engaged in the issues surrounding the evolution of their local telecommunications environment. They're concerned about the cost of services and the availability of competition. They express a need to access more services and information electronically, including government information and services. At the same time, they, similar to citizens nationwide, are concerned about the security and privacy of the information they provide, or that can be obtained from them, electronically. They also are very concerned about the impact of telecommunications infrastructure development on their environment, especially related to the potential negative aesthetic effects of an increasing amount of visible wires and structures.

Policy Statement: *The City will continue to inform, involve, serve the interest of, and receive input from citizens in both the implementation of the Telecommunications Policy and Plan, as well as in proceedings concerning future Policy and Plan reviews and changes. Regarding citizen telecommunications needs and interests, the City will work to advance the availability and diversity of cost effective telecommunications services within Rockville. The City will work to provide an increasing amount of government information and services electronically. The City will strive to protect the privacy of information provided by citizens, or obtained from them, electronically, consistent with State, Federal, and local law. The City will strive to protect the integrity of the information, systems and databases it maintains and provides electronically. The City will enhance its oversight, to the extent allowed under Federal and State law, of the placement of visible wires and structures consistent with the needs and interests of affected citizens and service providers.*

TELECOMMUNICATIONS PLAN
FOR THE CITY OF ROCKVILLE, MARYLAND

Introduction

The Telecommunications Plan described herein incorporates a series of action steps necessary to implement the City's Telecommunications Policy. The supporting detail for each set of action steps, and specific requirements and alternatives for implementation are found in the referenced appendices. These action steps will assist the City in meeting the following prime objectives stemming from its Telecommunications Policy:

- Continue to protect public health, safety and welfare.
- Facilitate deployment of advanced telecommunications technology and services both externally and internally.
- Maintain and enhance a pivotal role in management of the public Right-Of-Way (ROW) and City property.
- To the extent consistent with Federal and State law, create a level playing field for telecommunications system and service providers.
- Obtain fair and reasonable compensation for use of the ROW and City property.

The action steps are listed below in relation to the applicable Telecommunications Policy area. It should be noted here, as it is in the Policy, that successful completion of the action steps will require a coordinated team effort of a number of key individuals and groups.

1. **Compliance with, and Affect on, Federal Laws and Regulations.**

Policy Statement: *The City supports efforts which advocate the roll-out of telecommunications services on a competitively neutral and non-discriminatory basis. In this regard, the City will apply federal laws and regulations in a fair and impartial manner while continuing to preserve local authority.*

Applicable Action Steps:

- Continue to review the Telecommunications Act of 1996 ("the Act"), Federal Communications Commission (FCC) regulations and current FCC and Judicial decisions to monitor and update the City's knowledge of the Federal regulatory telecommunications framework.
- Participate in the development of legislation at the Federal level and lobby at the FCC to the extent permitted by law where FCC decisions can impact the rights and obligations of the City.
- Continue to support legislation which encourages the deployment of telecommunications services while, at the same time, retaining local regulatory authority.
- Encourage the delivery of advanced telecommunications services pursuant to Federal enablements and requirements, to all Rockville Communities including residents, educational institutions, libraries, businesses, government and other organizations.

- Advocate, develop and employ necessary means to receive fair and reasonable compensation for use of public property and the public right-of-way.
- Continue to comply with well-established Federal laws and regulations which affect telecommunications providers and the City. Where necessary, update the City's Telecommunications Policy and Plan to reflect prevailing Federal law, regulations and Judicial decisions.
- Apply Federal laws and regulations in a competitively neutral and nondiscriminatory manner.

2. **Compliance with, and Affect on, State Laws and Regulations.**

Policy Statement: *The City will continue to use current enablements given under State law to receive compensation for the use of the ROW, including seeking the recovery of all costs incurred by the City related to ROW use by commercial providers. Where necessary and appropriate to change State law to enable the City to receive more fair, reasonable and equivalent compensation from all users of the ROW, and in so doing help level the playing field and benefit the citizens of Rockville, the City supports efforts that advocate such change to State law. The City may work proactively with other local governments and allied entities on initiatives to change State law in this regard.*

Applicable Action Steps:

- Continue to use current State enablements that support the City's efforts regarding proactive management of the ROW, full cost recovery related to ROW management activities and ROW use impact, and regulation of cable television and other video services.
- Continue to work with the Maryland Municipal League, other local governments and allied entities to preserve local authority related to ROW use and the use of public property.
- Where beneficial to Rockville's interests, advocate changes to State law to enhance local authority over ROW users in order to level the playing field, improve the competitive telecommunications climate and receive fair and reasonable compensation for use of the ROW and public property.

3. **Encouragement of Competition.**

Policy Statement: *While continuing to appropriately manage the use of the public right-of-way, the City will encourage and promote competition in the local telecommunications marketplace. It will use all avenues open to it, to pursue an increase in the number and diversity of telecommunications services available in Rockville, including advocacy of beneficial initiatives at the State and Federal levels. It will make Rockville citizens aware of its efforts to promote competition through public reporting mechanisms, including electronic means such as the City's website.*

Applicable Action Steps:

- Support legislative, regulatory and other initiatives at the State and Federal level that work to open up the telecommunications marketplace to increase competition, while continuing to preserve local authority over the use of the public ROW and public property.

- Work through public private partnerships and other cooperative efforts to enhance the availability of advanced telecommunications infrastructure and services for the Rockville residential, business, organizational and institutional Communities. This should include working with established groups such as the Greater Rockville Partnership to continue to explore ways to identify and match business needs with current and potential telecommunications infrastructure and service providers for the benefit of Rockville's economic development.
- Develop initiatives at the local level through regulatory and other provisions and agreements that work to increase the availability of advanced telecommunications infrastructure and services in Rockville. These initiatives could include: provisions in cable and other video system agreements that foster the rapid development and deployment of advanced services; land use provisions that foster service and infrastructure deployment in new residential developments and business and industrial parks as such areas are first being developed; and other similar initiatives.

4. **Proactive Management of the Public Right-Of-Way (ROW).**

Policy Statement: *The City will continue to proactively manage the ROW. As part of this management function, the City will seek to enhance its permitting provisions and develop a comprehensive set of provisions that apply to all providers, as allowed by State and Federal law. These provisions will include measures to ensure that citizens do not subsidize private infrastructure development, by guaranteeing that the City is reimbursed for all of its direct and impact costs concerning the use of the ROW by commercial providers.*

Applicable Action Steps:

- Continue to utilize and enforce current beneficial ROW permitting and ROW use agreement provisions, such as: notice of construction requirements; non-transferability clauses; flexibility on establishing specific requirements of the City Manager related to ROW use; the filing of cash or corporate bonds; inspection requirements; and as-built map requirements.
- Review and implement changes to the ROW permitting and ROW use agreement process and provisions, including potential requirements related to joint excavations; longer time frames for repair and restoration responsibilities; the implementation of moratoria on recently repaved streets; shorter time frames on relocation requirements related to public works projects; electronic filing of as-built maps; and other beneficial provisions.
- Continue to review ROW permit and use fees and implement changes to ensure full cost recovery related to City permitting activities and compensation for street life degradation.
- Develop and implement a ROW management committee made up of key staff members from pertinent departments (City Manager's Office, Public Works, Community Planning and Development, Information Technology, City Attorney's Office, and others) to meet monthly or at some other necessary interval to discuss issues related to current and anticipated activity in the ROW.

- As part of continued GIS system implementation, develop layers related to telecommunications, cable and utility infrastructure placement to assist the City in its ROW management functions.
- Increase the development of electronic information flow, both internally and externally, related to ROW use permit applications processing, status and records information.
- Incorporate all the above, as well as other concepts from the Policy and Plan, into a new, overarching master telecommunications ordinance.

5. **Personal Wireless Communications Services.**

Policy Statement: *The City supports and encourages the roll-out of Personal Wireless Service facilities, while at the same time, retaining and enhancing its local zoning authority and its sensitivity to local concerns. Supplementing the existing zoning standards will continue to safeguard the public health, safety and welfare of Rockville residents, continue to treat functionally equivalent telecommunications services in an equitable manner and further manage public property and the public right-of-way which is held in trust for Rockville citizenry.*

Applicable Action Steps:

- Continue the review of existing local provisions and regulations in the zoning code and related materials which effect personal wireless services. Supplement, where necessary, current setback, height, rooftop location and equipment screening requirements.
- Implement a wireless service provider registration requirement, and inventory existing towers and antennas to determine whether zoning compliance exists and whether all applicable permits and leases have been obtained from personal wireless service providers in the City.
- Review existing leases between the City and providers to identify areas and substantive provisions which could be included in an overall personal wireless services and facilities ordinance. Beneficial provisions, for example, could include current or augmented requirements related to compensation, technical and siting specifications, indemnification, termination and other provisions.
- Continue to act in a manner which does not unreasonably discriminate among providers of functionally equivalent services.
- Evaluate timeframes currently utilized to review requests for authorizations to place, construct or modify personal wireless service facilities. Such reviews must be completed within a reasonable period of time after the request is filed, taking into account the nature and scope of the request.
- Further, address a number of specific considerations concerning the aesthetics and deployment of towers, antennas, powering equipment and other facilities and equipment.
- Develop and enact an overall personal wireless service facilities ordinance reflecting the results of the above review activities. This ordinance should address a variety of issues, including site selection criteria, preferences for public property, co-location requirements, permit and inspection requirements and non-use/abandonment provisions. Such an ordinance also should indicate that any decision to deny a

request to place, construct or modify personal wireless service facilities shall be in writing and supported by substantial evidence contained in a written record.

6. **Internal Telecommunications System Development.**

Policy Statement: *The City will continue to advance and develop its internal telecommunications systems for the benefit of its citizens. Such advancements lead to more efficient government operations, more accessible government services and a more informed citizenry. The City will use a combination of expanded or improved internal infrastructure, equipment and other resources, as well as continued outsourcing of some support functions, taking into account the best cost versus benefit analysis, to expand its provision of information electronically and heighten its video, voice, and data communications connectivity, capacity and capabilities.*

Applicable Action Steps:

- Continue to pursue current critical activities related to an upgrade of the City's E-mail system and Year 2000 (Y2K) compliance issues.
- Upgrade the City's telephone system. This should include a new PBX system with expanded voicemail capability.
- As competition increases in the local exchange carrier marketplace, review options for the most cost effective provision of dial tone services.
- Upgrade the City's data communications system. This includes: upgrading routers and some hubs at all pertinent City facilities; upgrading the Ethernet switch at City Hall; migrating to Fast Ethernet or higher capability at City Hall and the Gude Drive facilities; and incorporating additional network management and reliability enhancements for the entire network.
- Prepare for the migration over time of the City's video operations to all digital production, post-production and transmission equipment and facilities.
- Expand the connectivity options for video communications to include additional video program origination sites at the Senior Center and Civic Center facilities.
- Utilize fiber optic and other Institutional Network (I-Net) infrastructure, provided through cable franchise and other agreements to enhance Wide Area Network (WAN) connectivity between the City's facilities. For those facilities connected via fiber, this would include a minimum expansion in connection capacity for data communications of between 10 and 100 megabits per second (Mbps) and up to 2 Mbps for facilities not connected by fiber optic cabling. Concerning voice communications, for facilities connected via fiber a minimum of 2 T-1 circuits should be available, with other connectivity options pursued for those not connected by fiber. Where feasible and necessary, redundant pathing should be built into the I-Net infrastructure in order to enhance WAN reliability.
- Investigate direct, high capacity access to an Internet Service Provider to work to eliminate current slow system response and internet access delays and improve service levels concerning access to, and provision of, web-based services. Concurrently, the City should upgrade both its website hardware and software capabilities to increase the services that can be provided electronically. These services should ultimately include, for example, on-line registrations for a variety of City activities, especially those sponsored by Parks and Recreation.

- Place increased emphasis on development and use of the City's GIS system. This would include devotion of one or more full time resources to GIS system development and maintenance, as well as initiating broader delivery of GIS to critical desktop locations (such as in Public Works).
- Where feasible, investigate enhanced connections to other government agencies and organizations as desired by various City departments.
- Continue to monitor interest in the use of telecommuting, videoconferencing and teletraining, and employ such technologies as demand increases.

7. **Synergies With Montgomery County.**

Policy Statement: *The City will continue synergistic and efficient relationships with Montgomery County that provide significant and cost effective resources to the City for the benefit of its citizens. Where delays or other problems occur as part of the current relationships or agreements with the County, the City will review other options or the restructuring of current relationships and implement changes to eliminate delays and resolve problems.*

Applicable Action Steps:

- Continue, at present, the City's synergistic relationship with the County regarding the regulatory administration of the Cable TV Montgomery (CTM) cable franchise and other potential video system agreements. However, going forward, the City should consider a more direct role in regulatory administration as the number of video system providers may increase.
- Continue the City's synergistic relationship with the County related to 911 and other public safety telecommunications services. However, should the County not move forward with the implementation of a new 800 megahertz (MHz) public safety radio system in a short time frame, the City should consider moving forward with implementation of a new system on its own, as long as future compatibility with the County system can be accomplished in a cost-effective manner.
- Explore ways with the County to increase the capacity of the City's connection to the Internet (currently shared in a cost-effective manner with a number of County entities). If increased capacity and faster response times cannot be accomplished under modifications to the existing scenario, then the City should explore its own high capacity, direct connection to an Internet Service Provider.
- Continue the effective relationship with the County related to GIS system development. However, the City should work with the County to resolve in a cost-effective manner current obstacles to obtaining direct real-time access to all necessary portions of the County's database.
- Continue to explore ways to develop further synergies between City and County functions where costs can be saved or avoided and capabilities can be increased. However, the City should also develop capabilities on its own where existing or planned relationships may result in service delays and higher than necessary costs.

8. **Monitoring and Integration of New Telecommunications Technology and Services.**

Policy Statement: *The City will continue to monitor the development of new telecommunications technology and services and integrate them where appropriate to increase service levels and operational efficiencies and reduce costs. The City also will react and respond, in accordance with its Telecommunications Policy and Plan, to new telecommunications technologies and services that have an impact on the ROW or other public property. The City also will encourage the development and deployment of new telecommunications technologies and services that enhance the competitive service climate for Rockville's citizens, businesses, government, and other organizations and institutions.*

Applicable Action Steps:

- Continually monitor telecommunications technological trends as part of ongoing City research and development functions, to determine their potential application to both the City's internal and external telecommunications environments.
- At this point, actively monitor trends regarding: fiber optics transmission systems and applications; advances in wireless communications system infrastructure and applications; the development of Digital Subscriber Line services for both the home and business marketplaces; the continuing advancement of data-over-cable transmission technology and applications; and the rapidly increasing utility of the Internet for both voice and video, as well as data, communications.

9. **Continued Focus on Citizen Input, Involvement and Interests.**

Policy Statement: *The City will continue to inform, involve, serve the interest of, and receive input from citizens in both the implementation of the Telecommunications Policy and Plan, as well as in proceedings concerning future Policy and Plan reviews and changes. Regarding citizen telecommunications needs and interests, the City will work to advance the availability and diversity of cost effective telecommunications services within Rockville. The City will work to provide an increasing amount of government information and services electronically. The City will strive to protect the privacy of information provided by citizens, or obtained from them, electronically, consistent with State, Federal, and local law. The City will strive to protect the integrity of the information, systems, and databases it maintains and provides electronically. The City will enhance its oversight, to the extent allowed under Federal and State law, of the placement of visible wires and structures consistent with the needs and interests of affected citizens and service providers.*

Applicable Action Steps:

- Continue to inform, involve, serve the interest of, and seek input from, all Rockville Communities of Interest as the City implements both the Telecommunications Policy and Plan.
- On an annual basis, review the Policy and Plan and seek input from the citizenry on any prospective modifications.
- Specifically regarding the residential community, set as a high priority the creation of a telecommunications services climate that promotes local telephone service

competition, higher speed Internet access, and significant infrastructure oversight that is sensitive to the concerns of citizens regarding visible wires, equipment, housings, towers, antennae, and other infrastructure.

- Specifically regarding the business community, set as a high priority the creation of a telecommunications service climate that reduces the cost of telecommunications services, promotes a variety of avenues for electronic (e) commerce and facilitates a high degree of network reliability through the presence of a number of redundant provider options.
- Continue to increase the City's provision of information and services electronically. The City should employ appropriate safeguards to protect the integrity of information, systems, and databases the City maintains and provides electronically. The City should develop a specific policy and employ appropriate safeguards to protect the privacy of information provided by citizens or obtained from them electronically consistent with State, Federal, and local laws. The City should post its privacy policy on its website.

APPENDICES

Telecommunications Policy/Plan Appendices
Navigation List

Appendix #	Relates Primarily to Policy Statement(s) #	Title
1	1, 2, 3, 4, 5	Impact of, and Current Issues Related to, Federal Law
2	2, 3, 4, 7	Impact of, and Current Issues Related to, State Law
3	1, 2, 3, 4	Proactive Management of the Public Right-Of-Way
4	1, 3, 5	Personal Wireless Services Overview
5	3, 6, 8	Voice Telecommunications System Report
6	3, 6, 7, 8	Data, Video, and Other Communications Systems Review
7	6, 7, 8	Institutional Network (I-Net) Use for the City of Rockville
8	6, 7, 8	Rockville Departmental Telecommunications Needs Assessment Report
9	3, 5, 6, 8, 9	Overview of New Telecommunications Technologies
10	3, 5, 6, 8, 9	Residential Telecommunications Needs Assessment Report
11	3, 6, 8, 9	Business Telecommunications Needs Assessment Report
12	3, 4, 5, 8, 9	Overview of the Competitive Telecommunications Climate in Rockville

Appendix 1

Impact of, and Current Issues Related to, Federal Law

The Telecommunications Act of 1996 (the "Act") provided a framework that was to encourage both competition and the development of advanced telecommunications services. Lawmakers envisioned that by encouraging competition, new products and services would be made available to all Americans. In this regard, legislators were very cognizant of avoiding the creation of information "haves" and "have nots". By providing open access to telecommunications networks for consumers and service providers, advancing universal service and developing a new regulatory framework, the stage was set for the advent of futuristic services.

The role of local government was specifically retained in several sections of the Act. At the same time, the Act provided in Section 253 - Removal of Entry Barriers that:

> *(a) In General - No State or local statute or regulation, or other State or local legal requirement, may prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service.*

Congress was concerned that adoption of ordinances and regulations by local regulators might thwart the impetus for business and industry to create new products and services and to provide them to customers. It also recognized that under State law, public service commissions already had an important role. What sounded simplistic is actually very complex in its application.

Cable television operators are treated differently than other telecommunications services. Open video system providers have some cable-like requirements with respect to fees and Public, Educational and Governmental Access responsibilities. Also, they still must obtain agreements with local government while making available a significant portion of their channel capacity to other providers.

Additional regulations apply to personal wireless service providers. In some cases, they construct their own facilities including towers and antennas. In other instances, they utilize the backhaul networks of existing phone companies in conjunction with leased tower and other space for antennas. An overview of Personal Wireless Services regulation is found in Appendix 4.

The importance of Institutional Networks (I-Nets) was reaffirmed in the Act and such networks continue to retain a significant role in franchise and other negotiations with municipal authorities. These Institutional Networks provide opportunities for not only high speed data and other transmissions but also can provide significant cost savings for local government. As these networks develop, opportunities exist for many types of voice, video and data communications. Information pertaining to the development of I-Net services for the City is found in Appendix 7.

The role of the City is critical in the development of the Plan and Policy in that the City is seen as being progressive and innovative. At the same time, it must act in conformance and compliance with federal law. The City, under its regulatory authority and in keeping with

the Act, is empowered to receive fair and reasonable compensation for use of its property and right-of-way (ROW). The drafters of the Act also recognized that municipal authorities would need to protect City infrastructure already in place while enabling new entrants, through proactive management of City rights-of-way. This is a critical point, given the water, sewer, utility and other telecommunications lines and facilities which have been installed for many years.

Specifically, the Act states:

> *(c) State and Local Government Authority - Nothing in this section affects the authority of a State or local government to manage the public rights-of-way or to require fair and reasonable compensation from telecommunications providers on a competitively neutral and nondiscriminatory basis, for use of public rights-of-way on a nondiscriminatory basis, if the compensation required is publicly disclosed by such governments.*

To implement the Plan and Policy will have a financial impact on the City. Related to ROW and public property management, the City should at a minimum recover its direct and indirect costs related to ROW management and a fair rental value related to the use of City property.

While ensuring open access to markets, the City will at the same time want to protect the privacy of its residents. This balancing is challenging for the Mayor and Council whose constituents both want the services, as evidenced by survey results, and yet still may not want unwarranted intrusions from providers hoping to enlarge their customer base.

Against this backdrop, actions of the Federal Communications Commission (FCC) and Judicial proceedings throughout the United States provide some advice and guidance with respect to potential outcomes. The decisions are often inconsistent and in conflict with each other, and sometimes, even with the facts at hand. Industry lobbying is a powerful force related to federal law outcomes and their impact on cities. Yet, there are opportunities for the City and industry to work together in a constructive manner.

To cite examples of just a few questions which have or are being considered are the following judicial cases and FCC decisions:

AT&T Communications of the Southwest v. City of Dallas, 1998 U.S. Dist. LEXIS 8932, 1998 WL 309145 (N.D. Tex. 6/8/98) ("Dallas I") - AT&T was a franchised long distance or interexchange carrier ("IXC") in Dallas pursuant to a 15 year franchise which permitted the provision of long distance services. After passage of the 1996 Telecommunications Act, AT&T indicated that it intended to use its existing fiber optic facilities and those of Southwestern Bell to provide a local service -"AT&T Digital Link" - to Dallas customers. Dallas required AT&T to complete an 18 page franchise application, receive a franchise, and pay a 4% franchise fee. AT&T sought a preliminary injunction against enforcement of

the City's franchising ordinance. **Held:** That the City could require a franchise and fee only with respect to AT&T's use of City's rights-of-way. The City could not charge a fee based on AT&T's use of Southwestern Bell's facilities. The decision was made under both Texas state law and the 1996 Telecommunications Act. The decision particularly relies on the earlier Texas federal district court decision in *AT&T Communications of the Southwest, Inc. v. City of Austin, Texas* 975 F.Supp. 928 (W.D.Tex. 1997). We are not aware of any appeals at this time. **Importance:** This is one of a number of decisions which suggest that lessees of franchised facilities cannot be independently franchised and that authority to franchise only arises where right-of-way is used directly.

AT&T Communications of the Southwest, Teligent, Inc., et al., v. City of Dallas, (N.D. Tex. 7/7/98) ("Dallas II") - Teligent sought a preliminary injunction against the City's franchising ordinance arguing that it would provide local service via wireless technology and facilities located on private, not public, property. **Held:** Same as above. Specifically holding that the local franchising authority contemplated by the 1996 Act requires nexus to local government via use of public rights-of-way. We are not aware of any appeals. **Importance:** Same as above.

TCG Detroit v. City of Dearborn, 977 F.Supp. 836 (E.D.Mich. 1997) ("Dearborn I") - TCG Detroit (AT&T subsidiary) alleged that a variety of provisions in Dearborn's franchising ordinance violated the 1996 Telecommunications Act. Particularly, TCG alleged two Counts: 1.) that the ordinance violated Section 253(a); and 2.) violated Section 253(c). In Dearborn I, the City moved to dismiss Count 2 on the grounds that Section 253(c) does not provide a private cause of action - that is that local regulation which complies with the "fair and reasonable compensation" and "competitively neutral and nondiscriminatory" provisions of 253(c) is in a "safe harbor" but that these provisions do not impose new, affirmative requirements on local regulation. TCG alleged that the City's ordinance was discriminatory because it could not be applied to Ameritech which has a statewide franchise in Michigan. **Held:** That Section 253(c) does create an implied private cause of action allowing operators to attack local regulation as discriminatory or exceeding "fair and reasonable" compensation. The court clarified that discriminating against a telecommunications provider in fees, costs or other requirements under Section 253(c) is not the same as prohibiting the ability of an entity to provide telecommunications service in violation of Section 253(a). Further activity in the case is discussed below. **Importance:** This decision directly conflicts with a prior federal district court decision in *GST Tucson Lightwave, Inc. v. City of Tucson*, 950 F.Supp. 968 (D.Ariz.1996), which held that Section 253(c) is only a safe harbor for local regulation. The court specifically noted this conflict in decisions which may eventually be resolved by the U.S. Supreme Court. Prior to such resolution, local governments should assume that Section 253(c) does create affirmative obligations on local regulation.

TCG Detroit v. City of Dearborn, 1998 U.S. Dist. LEXIS 12737, 1998 WL 493128 (E.D.Mich. 8/14/98) ("Dearborn II") - TCG was licensed by the state Public Service Commission to construct facilities in public rights-of-way in the City to provide local telecommunications services. The City maintained that TCG must receive a franchise. TCG alleged that the City had violated Section 253 by failing to require a franchise of

Ameritech. Upon filing of the suit, the City requested that Ameritech obtain a franchise, Ameritech resisted, and the City joined Ameritech in the suit. TCG also alleged that the franchise ordinance violated Section 253 on the grounds that the required compensation was not fair and neutral. Specifically, TCG alleged that the City could only recover its costs pursuant to Section 253 and could not raise revenues. Finally, TCG alleged that the franchise requirement effectively prohibited TCG's entry into the market. **Held:** The Court specifically rejected TCG's claims that requiring a franchise prohibits entry and that revenue raising fees violate Section 253. The Court stated "there is nothing inappropriate with the city charging compensation, or "rent", for the city owned property that the Plaintiff seeks to appropriate for its private use. The statute specifically allows it (citing Section 253(c)". Further, the court found that a relevant factor in determining whether compensation is fair and reasonable is what other providers are willing to pay. Finally, the Court determined that the City had not acted discriminatorily in violation of Section 253(c) because the City sought to franchise Ameritech but could not due to Ameritech's state wide franchise. We are not aware of any appeals. **Importance:** The case clarifies that treatment of providers need not be identical where the status of providers is different. The Court specifically indicated that municipalities may analyze the provider's size, the contemplated use of the right-of-way, the space available, the existence of a state wide franchise, etc. in determining what franchise requirements to impose. In short, the Court found that the 1996 Act does not require strict equality. The Court also rejected the argument that requiring a franchise or the payment of a fee (where such franchises or fees are allowed under State law) could be considered a barrier to entry. Interestingly, TCG presented evidence that its telecommunications facilities would be owned by the local electric utility and merely leased-back but apparently did not argue that it therefore could not be franchised pursuant to the cases noted above.

In the Matter of Entertainment Connections, Inc.: Motion for Declaratory Ruling, FCC 98-111, Memorandum Opinion and Order, Released June 30, 1998 ("ECI Decision") - ECI filed a motion for declaratory ruling that it is not a cable operator required to obtain a cable franchise under Title VI, the Cable Act. ECI argued that it is not a "cable operator" pursuant to the Communications Act definition because it is a SMATV operator and only uses Ameritech facilities but does not own or control its own facilities in the right-of-way. **Held:** The FCC made a number of dubious factual determinations in order to conclude that ECI does not own or control facilities in the right-of-way and therefore is not a cable operator. Municipal and cable interests have petitioned for reconsideration. FCC action is pending. **Importance:** ECI owns facilities such as wires and a headend that are located on private property. It merely leases the transmission lines located in the right-of-way from Ameritech. Collectively, "the system" is located in the right-of-way except that the portions thereof owned outright by ECI are not. The FCC had to reach the convoluted factual conclusion that ECI's video/television programming services are not provided via one "system" but rather a number of total separate systems with differing regulatory obligations. If this decision stands, it could encourage creative and deceptive arrangements with telecommunications providers so as to avoid local franchising requirements.

In the Matter of TCI Cablevision of Oakland County, Inc: Petition for Declaratory Ruling, Preemption and Other Relief Pursuant to 47 U.S.C. §§ 541, 544(e), and 253, FCC 97-331,

CSR-4790, Memorandum Opinion and Order, Released September 19, 1997 ("Troy Decision") - TCI requested that the FCC rule: 1.) that cities could not require a cable operator to get a telecommunications franchise pursuant to state law where the operator already had a cable franchise; 2.) that cities could not require compensation from a cable operator beyond the cable franchise fee; 3.) that any ordinance requiring a telecommunications franchise violated Section 253; and 4.) that the Cable Act (Title VI) prohibited cities from requiring a cable operator to build a particular "transmission technology" in the form of fiber optics or an Institutional Network. The City of Troy required TCI to obtain a telecommunications franchise prior to providing phone service. The City included prohibitions on using any fiber facilities to provide telecommunications services in building permits which were issued in relation to TCI's system rebuild. **Held:** The FCC rejected all of TCI's requests but ruled that Troy violated the 1996 Telecom Act on a very narrow basis. The FCC indicated that the City could not condition TCI's building permits for fiber optic upgrades of the cable network with prohibitions on using the fiber to provide telephone service. The FCC indicated that the Title VI Cable Act authority granted to municipalities could not be used to limit or regulate Title II telecommunications activities. However, the FCC indicated that municipalities could regulate telecommunications activities via franchises or other vehicles to the extent permitted under state law. Municipal interests have petitioned for partial reconsideration of the decision arguing that permitting is a generic activity which is not exclusive to Title VI cable regulation. Industry interests have opposed that petition and have also requested that the FCC expand its ruling to reach some of the 4 claims for relief listed above. Action by the FCC is pending. **Importance:** Although the case received broad national attention and nearly all industry and municipal associations participated in the initial comment process, the decision is so narrow and confusing that general consensus is that the case fails to clarify any issues. Further FCC action could shed light on the important issues raised. However, in view of a number of federal judicial decisions regarding these issues, some of which are discussed herein, it is unlikely that the FCC will address the issues.

Iowa Utilities Board, et al v. FCC and related cases - The cited case, which is a consolidated group of federal district court actions decided by the 8th Circuit Court of Appeals, along with federal cases from other Circuits are on appeal to the U.S. Supreme Court. The 8th Circuit issued the broadest ruling to-date in determining that a variety of the provisions in the FCC's Interconnection Order (*First Report and Order, Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket No. 96-98 (Aug. 8, 1996)), violate a variety of provisions of the 1996 Telecommunications Act. Other district and appeals courts have acted in these matters. For example, on December 22, 1998, the U.S. Appeals Court, D.C. Circuit, unanimously rejected BellSouth's appeal of the FCC's rejection of its application to provide long distance service within its local phone region in South Carolina. It ruled that the 1996 Act's 14 point "checklist" which triggers authorization to provide long-distance service does not violate the Constitution. The court rejected the "bill of attainder" argument advanced by BellSouth, noting that Section 271 "restrictions are no more burdensome than those of the [modified final judgement in the AT&T divestiture case]." Previously, Judge Joe Kendall of the U.S. District Court, Wichita Falls, had ruled to overturn the 1996 Act sections barring Bell companies from the long distance, electronic publishing, alarm monitoring and manufacturing markets as a bill of attainder.

Subsequently, the 5th Circuit Court of Appeals in New Orleans, overturned that decision ruling that the 1996 Act's Sections 271-275 are constitutional. The 5th Circuit ruled in a 2-1 vote September 4 that it didn't think those "special provisions" of the Act constitute a bill of attainder intended to punish the Bells, as SBC, and two other telcos, had argued. On October 20th, SBC asked the U.S. Supreme Court to review the decision. On January 19, 1999, the U.S. Supreme Court turned down the appeal without comment.

The cases and decisions summarized above are merely illustrative of the uncertainty and complexities which surround the Act. New Court decisions and FCC Rulings may shed further light on these and other issues. However, whether those decisions are binding as precedent, and whether the facts therein are materially similar to matters at hand, are questions that must be evaluated in a fluid environment.

Thus, it is the recommendation of the Plan and Policy that the Mayor and Council develop a Model Telecommunications Ordinance to address these and other issues. Such Ordinance will further define and also create the framework for provider entrance into the City and its telecommunications markets.

In addition to the foregoing, the Act covers a multitude of other issues, including matters such as local telephone company provision of video services, local and state taxation, and a host of cable regulatory provisions. When considering the fact that the City and County currently have existing agreements with respect to the regulation of cable providers and considering State requirements concerning telephone companies and local taxes and fees, it is easy to see that, while federal law provides the overall framework, state and local laws, regulations and agreements must all be considered in overall telecommunications regulation and oversight.

Appendix 2

Impact of, and Current Issues Related to, State Law

The City has for many years supported a policy which maintains municipal control of rights-of-way. The City's approach has also reflected concerns regarding legislation that could possibly preempt local control. Since right-of-way (ROW) property is held in trust, the City retains the right to receive fair and reasonable fees for its usage, consistent with the parameters of State law.

As set forth in the testimony by the City Manager to the Montgomery County State delegation on November 7, 1996, local jurisdictions expend considerable amounts of money to maintain rights-of-way. For several years, the City has noted that private usage of rights-of-way was increasing. The impact upon the City and other local jurisdictions is significant. There are costs to the City which are both direct and indirect. While the City wants to encourage telecommunications progress, it also has a corresponding obligation to "all citizens to protect their investment, to regulate use of rights-of-way and to receive compensation." Further detail concerning specific ROW management issues is found in Appendix 3.

The Maryland State Constitution specifically recognizes the City of Baltimore and authorizes Baltimore and County governments to adopt the types of charters which control responses to a great variety of local issues. In this regard, Baltimore is given special powers under State law; however, other cities have those powers which are not inconsistent with applicable State statutes or State laws. For example, cities have been granted specific franchising authority with respect to cable service but not with respect to telecommunications service in general (See Muni. Corps. 23A, Section 2 (b) (13)). However, cities do have right-of-way regulatory authority by virtue of their police powers or related statutory provisions.

The Maryland State Legislature has indicated that franchise fees are prohibited for cities (such as Rockville) unless such a fee was in effect on or before January 1, 1954, or unless the Legislature specifically grants such rights pursuant to specific authorization in special legislation. An example of such specific authorization relates to the franchising of cable television providers. Since the specific grant of franchising authority allows franchising of "community antenna systems," this term could encompass open video system and other cable-like providers. Further discussion on the City's existing and potential activities concerning cable franchising can be found below.

Thus, Article 23, Section 340 (Construction authority of telegraph and telephone companies), and Article XI-E, Section 5 (Taxation, debt limitations), pose challenges for the City. However, the annotated Code of Maryland does provide some support for the City in other areas, specifically Article 23 A, in Section 2 (b) (5), (13), (30) and (36). However, it should be noted that under 67 Op. Att'y Gen. 307 (1982), the authority delegated to a municipal corporation under Subsection (b) (32) and (33) to regulate or to license and regulate under its police powers does not include the authority to impose a license, tax or fee to raise revenue if there is no reasonable relation to the expense of regulation.

The most favorable result for the City could be legislation further clarifying the authority of the City to charge and regulate telecommunications providers for use of municipal rights-of-

way. Such enabling legislation would clearly provide the City with the ability to franchise telecommunications providers so long as such actions were consistent with Federal law as well. A reference in Article 23 A, Section 2 (b) (13), which broadens the reference involving cable television to also include telecommunications providers, could be an appropriate place for such modification.

One approach which has been taken by Prince George's County has been to adopt regulation to collect compensation for use of the right-of-way. According to local newspapers, opposition to such legislation was brought by an alleged "grass roots" organization which, in fact, was reported to have been funded by AT&T. Although the legislation specifically exempted basic telephone service, staunch opposition was brought by those that did not want to compensate the municipality.

Legislation at the state level throughout the United States varies significantly in terms of requirements affecting telecommunications providers. Some legislation passed by states such as Indiana and Colorado pose significant hurdles for local governments. Other states, such as Michigan, Oregon and North Carolina, are more favorable to local governments. Industry providers often attempt to limit compensation to right-of-way management costs.

The Maryland Municipal League (MML) has discussed possible telecommunications legislation, but because of the complex legal issues involved, has decided to study the matter further before deciding whether to submit proposed legislation. The City has a long history of working with other local governments and the MML on matters of common concern, and the City has expressed its willingness to be an active participant in this process.

In fact, the Assistant City Attorney for the City has provided testimony explaining the City's position regarding the need for legislation to clarify the authority of municipalities to grant franchises to telecommunications providers. In his testimony, he discussed the many ways in which telecommunications infrastructure impacts the City. As he noted, the issues identified are just the beginning, since, as he stated, "As technology continues to change and competition increases, the problems we must resolve will grow."

Overall, appropriate steps in developing and fostering State legislation should include:

- coordination with other local governments,
- the widespread dissemination of information,
- continuing to work with Statewide municipal organizations, including the Maryland Municipal League, and
- providing information to State agencies and the Governor's Office.

It will also be important in such activities to build coalitions with consumer groups, schools and libraries. In developing this strategy, the City should focus on both short-term goals and a long-term vision.

In this regard, applicable action steps would include:

- continued use of current State enablements that support the City's efforts regarding proactive management of the right-of-way,

- working with local governments, allied entities and the Maryland Municipal League to preserve local authority related to right-of-way use and the use of public property, and
- where beneficial to Rockville's interests, to advocate changes to State law to clarify and enhance local authority over the right-of-way users.

Concerning cable franchising, the City's approach to date has been a synergistic one with the County, whereby the County performs overall administration in exchange for 30% of the City's franchise fee. This 30% equates to approximately $100,000 on an annual basis. The City has found this arrangement beneficial in the past because of the number and types of activities performed by the County, including:

- overall franchise administration,
- lead negotiator on terms and conditions related to renewals and transfers (of which there have been a number),
- complaint handling and interface with CTM's customer service on consumer issues,
- signal quality inspections,
- design review, except for that related to City permit applications,
- oversight of public and educational access, and
- financial review, including audit of franchise fees.

If the City were to fully administer the cable franchise during system start-up activities, it is estimated that the City would need to expend approximately 1.75 FTE, plus associated benefits and overhead support costs, to handle all of the activities listed above. This would also equate to approximately $100,000 on an annual basis. This shows that during periods of high activity, costs paid to the County may be seen as reasonable.

Our analysis indicates, though, that as the number of providers may increase (providing an economy of scale) and consequently overall franchise fees may increase, and as systems become more of going concerns (such that the level of activity related to administration decreases), then the City may need at that time to only devote .5 FTE, plus benefits and overhead, to cable administration. At that point, we believe it would be advantageous for the City to consider taking over administration of its video franchises, if it could administer them all. This would mean altering the current agreement with the County.

It is important to note here that the County has indicated that it believes that the fee paid to the County by the City is more than just reimbursement for administration activities. The County also believes that a portion of the fee is an appropriate contribution to administrative support for overarching system obligations (such as public and educational access as well as Institutional Network services for County schools and libraries, since such services benefit Rockville citizens). Accordingly, further discussion with the County would need to occur in order to more specifically define appropriate apportionment of the fee, and determine the specific nature of the County/City relationship going forward, if the City moved to begin administration of all of its video franchises in the future.

Appendix 3

Proactive Management of the Public Right-of-Way

INTRODUCTION

Under its authorities pursuant to Federal and State law, the City is enabled to regulate and manage the use of the public right-of-way (ROW). The City is also able to charge a fee in accordance with the permit, license, franchise or other form of permission issued to a ROW user by the City. The following discussion covers a review of existing City ROW entrance processes, organizational information flow and activity, ROW use regulations and permit fees. In the subsequent Conclusions and Recommendations section, we recommend potential enhancements to current processes, regulations and fees that should be included in an overall Master Telecommunications Ordinance (MTO).

DISCUSSION

The Rockville City Code (RCC) contains regulations dealing with permitting, inspection fees, bonding and other related requirements. Many of these requirements are set forth in RCC Section 21-41, Section 21-42, Section 21-43 and Section 21-44. These Sections contain specific requirements for obtaining permits; a process by which permit fees are implemented; conditions for permit issuance; and performance bond parameters. Some of the major beneficial provisions include:

- Everyone, including any utility corporation, must first obtain a permit from the City for the purpose of installing or connecting underground lines or otherwise performing any type of construction or installation of either a permanent or temporary nature within a public right-of-way or easement.
- Permits are non-transferable. Permits automatically expire within six months after issuance, unless extended in writing by the City Manager. As indicated below, utility permits issued by Public Works have a one year validity term unless extended by Public Works.
- The City Manager may direct additional written requirements to the permittee, either before or during construction, that are deemed necessary by the City in the interest of public safety or public convenience.
- Construction work, materials, plans and specifications shall at all times be open to and available for inspection by City officials and employees.
- If, in the opinion of the City Engineer, the conditions of a permit are being violated, the Engineer may order the permittee to stop construction and may revoke the permit.
- Where the City Engineer finds that the permittee's proposed standards and specifications are not feasible or practicable, the Engineer may require alternate or additional standards and specifications, and such shall be made part of the permit conditions.
- Prior to beginning grading or construction, a permittee is required to deliver a cash or corporate bond to ensure performance, acceptable to the City Manager and City Attorney.

Regarding permit fees, RCC Section 21-42 requires that the applicant for a permit to undertake any ROW use project shall pay to the City a percentage, as set by resolution, of the estimated cost of such project as an inspection and engineering fee. In July of 1994, Resolution No. 15-94 was adopted by the City. This Resolution provides an established

schedule of fees for certain permits, including fees for engineering review and inspection pertaining to road construction work within a public right-of-way or easement.

The fee schedule calls for a fee equivalent to four percent (4%) of the cost of the project as estimated by the City Engineer, unless the installation is for the sole purpose of connections to premises (in this case, the fee is a flat $25.00). Subsequently, the percentage fee has been delineated as:

- sixty cents per linear foot for work in asphaltic or concrete roadways
- thirty cents per linear foot for work in sidewalks and grass strips
- no cost for working in existing manholes/conduit (where no street cut is involved) or for working on poles

Some longtime ROW users, such as PEPCO (Potomac Electric Power Company), Bell Atlantic and Washington Gas, have standing bonds but are still required to obtain permits for all work in the ROW. Additionally, WSSC (Washington Suburban Sanitary Corporation) has a standing bond but, under State law and regulation, is not required to obtain a permit to work in City right-of-way. Others, such as MCI Metro Access Transmission Services (MCIM), were required to obtain a Right-of-Way Use Agreement before applying for permits. At this point, any new entrant into the ROW has to obtain such an Agreement and applicable permits.

The current permit has a number of beneficial provisions, including:

- advance notification of construction,
- filing of technical and engineering specifications,
- filing of as-built plans upon completion of construction,
- stipulation of the agreement as a non-exclusive, revocable license,
- default and revocation provisions,
- indemnification provisions,
- insurance provisions,
- limitations on assignment and transferability, and
- bonding provisions.

After agreements have been signed and permits have been issued, the procedure for inspecting utility permits is set forth in a Public Works document dated July 8, 1997. Exceptions are granted to PEPCO, Bell Atlantic and Washington Gas where work is performed in rights-of-way due to emergency situations. If City inspectors find someone working in City rights-of-way without a required permit, the inspector is authorized to ask them to stop work, leave the area in a safe condition until receipt of a permit and, where necessary, City police can be notified to assist as well.

The procedure for issuing utility permits is also set forth in a Public Works document dated July 8, 1997. Certain specific requirements are provided for PEPCO, Washington Gas, Bell Atlantic, Cable TV Montgomery and other similar ROW users, as set forth in the Public Works document. This document describes the process by which permit requests and applications are received, processed and issued, including monthly billing procedures for obtaining permit fee payments. Specifically:

- Permit applications are received either via the mail or occasionally in person.
- They are date-received stamped and then given to the Senior Engineer Technician for review and authorization and issued a permit number.
- Approved originals are returned either by mail or are picked up by the applicant.
- Approved permits and plans are given to a contract manager for inspection and engineering work processing.
- Concerning billings, a standard utility bill form is used, and the pertinent company is billed each month for the permit fees related to the permits issued the previous month.

Permits, such as those issued on the Public Works form dated January 25, 1996, set forth various construction requirements and guidelines for providers. These requirements, as detailed in the form, cover such provisions as:

- excavation not being left open overnight,
- providing adequate lighted barrels and other necessary safeguards,
- work not interfering with the free flow of traffic between certain hours,
- proper burial depth of cable,
- contacting homeowners for any work on private property,
- boring all driveway and roadway crossings,
- immediate restoration of all areas following installation, including removal and replacement of any curb, gutter, sidewalk or paving undermined by construction, and
- separate permitting requirements for State road or Montgomery County rights-of-way construction.

Several meetings have occurred with Public Works and other staff to review and discuss current processes. Generally speaking, the Public Works Department is divided into the Engineering and Operations Divisions. The ROW work, permitting and entry process flows through these Divisions and various other pertinent departments within the City, as described above. There is routine but informal coordination between appropriate staff in Public Works, the City Attorney's Office, the City Manager's Office (such as the Cable/Telecommunications Coordinator) and Community Planning and Development Services on matters involving cable and telecommunications companies and other users of the ROW.

As telecommunications providers continue to want to deploy their services, increasing infrastructure requirements will be placed on the public right-of-way. Facilities-based communications companies currently utilizing the ROW include Bell Atlantic, Cable TV Montgomery, MCIM and MFN (Metromedia Fiber Networks). Additionally, there are telecommunications service resellers and pole users (such as wireless data service provider Metricom) also currently using the ROW. Further, over forty (40) Competitive Local Exchange Carriers (CLECs) may be looking to use the ROW in the future as either resellers or as, at least partially, facilities-based carriers (one of these, KMC Communications, and a non-CLEC, HNI, have recently made inquiries about facilities-based use of the ROW). Further, given current negotiations between Montgomery County, participating municipalities and Starpower, it is very likely that Starpower may want to provide either cable television service or open video service in the City soon.

CONCLUSIONS AND RECOMMENDATIONS

Overall, the City has broad and significant authority, under the RCC and State law, over use of City ROW. The City Manager has significant power to determine enhanced and additional requirements to current permit regulations. The Mayor and Council have the power to expand the ordinance and change the permit fee schedule.

After review, it is apparent that the City has placed significant emphasis on right-of-way management in the provisions of the Rockville City Code, its rights-of-way use Agreement provisions, Public Works procedures for issuance and inspection of permits and the development of knowledgeable staff to address and enforce City regulations. Based on the level of current and anticipated activity, though, we recommend that the City strengthen and add to existing provisions, formalize coordination activities between various departments and revise its fee structure to, at a minimum, reflect the City's current and anticipated costs related to all functions of ROW management, as well as incorporate any necessary street life recovery costs.

Generally, as part of proactive management of the public right-of-way, this means that the City should:

- continue to utilize and enforce current beneficial right-of-way permitting and right-of-way use agreement provisions,
- implement changes to the right-of-way permitting and right-of-way use agreement provisions, as detailed below,
- as further described below, continue to review right-of-way permit and use fees and implement changes permitted by State and Federal law,
- develop and implement a Right-Of-Way Management Committee made up of key staff members from pertinent departments,
- as part of the continued GIS system implementation, delineate infrastructure placement layers to include cable, utility and telecommunications infrastructure, and
- increase the development of electronic information flow, both internally and externally, related to right-of-way use permit application processing, status and records information.

All of these types of provisions can be detailed in the Right-of-Way Management sections of a Master Telecommunications Ordinance and in a Personal Wireless Services Ordinance. It is our recommendation that these two ordinances be developed by the City so that the City can further safeguard and regulate the use of public rights-of-way and public property, while also taking into account telecommunications infrastructure impact upon private property.

Specifically, some new or supplemental requirements which we recommend adding to existing provisions include:

- Registration of all providers, whether facilities-based or leasing capacity from existing carriers, so that the City may be aware of all carriers serving City residents and businesses.
- Additional bonding requirements, including potential provisions for cash deposits and letters of credit and longer periods of time (potentially up to five years) that such deposits, bonds or letters of credit are held by the City.

- Longer timeframes for application review than included in some current Agreements.
- Faster timeframes for facilities relocation, when necessary for public improvement projects, than the current one hundred twenty (120) days.
- A minimum five year responsibility for restoration and repair guarantees.
- The implementation of one year or greater moratoria on recently repaved streets. Alternatively, a requirement to repave curb to curb, intersection to intersection, for street cuts in or undermining of recently repaved streets could be instituted.
- Formal joint excavation requirements, where necessary, to reduce impact on the streets.
- Requirements for five year plans from current and prospective ROW users, to be coordinated with a City-implemented five year street repavement plan.
- The filing of as-builts in an electronic format acceptable to the City. Alternatively, a portion of the permit fee can be designated for conversion cost from the applicant's as-built format to the City's electronic format.
- Additional abandonment and sanction provisions.

These and other provisions, as well as the host of existing beneficial provisions found in current departmental documents, the Rockville City Code and rights-of-way usage Agreements, would be consolidated and refined and placed in an overarching MTO.

Concerning potential permit recovery fee categories, there are a number of possibilities for enhancement. Such enhancements would need to be developed and incorporated in a manner which complies with both State and Federal law. Overall, we believe that the City's current permit fees are not recovering all of the City's pertinent ROW management costs. For example, the information below includes cost components in Public Works, Community Planning and Development Services, Legal, the City Manager's Office, Mayor and Council, and other functions as well, that should be considered as part of an overall permit and application fee structure. Some of the intricacies involve administrative costs, inspection costs, right-of-way maintenance costs, street life recovery costs, support staff and other variables.

Some Potential Permit Fee/ROW Use Agreement Cost Recovery Categories

<u>Public Works</u>

- Administrative Costs (Personnel Time, Permit Processing, Planning, Research, ROW Management, etc.)
- Inspection Costs
- Street Life Recovery Costs
- ROW Maintenance Costs (Non-Reimbursed Repair and Replacement, ROW Upgrades/Improvements, etc.)

Community Planning and Development Services

- Administrative/Regulatory Costs
- GIS System Development/Maintenance
- Ancillary Inspection Costs (If Not Recovered Separately)
- Other Public Property Costs (If Not Recovered Separately)

Legal

- City Attorney/Assistant's Staff Time
- Legal Administrative Support Costs

City Manager

- Cable/Telecommunications Coordinator's Time
- City Manager's/Deputy's Time
- Administrative Support Costs

Mayor and Council

- Elected Officials' Time
- Support Staff Time
- Mayor/Council Administrative Support Costs

Other Departments

- Management/Support Staff Time
  For: Finance (Administration/Revenue), Information Technology, Police, Boards, Commissions, etc.

Overhead Costs

- For All Above - Materials, Equipment, Office Leases, Utilities (Power, Phone, etc.), Vehicle Use, etc.

Third Party Costs

- Consultant Fees
- Other Contract or Outsourcing Costs (Publication, Copying, Equipment, Temporary Support, etc.)

Impact/Indirect Costs

- Loss of ROW Use (Temporary, Permanent)
- Loss of Business (Including Loss of Sales Tax and Other Revenues)
- Neighborhood Disruption
- Vehicular and Pedestrian Traffic Rerouting
- Loss of Time; Inconvenience
- Increase in Vehicle Idling Time; Pollution

ROW Acquisition Cost Reimbursement

- Original Costs
- Associated Debt Financing Costs

The City is currently reviewing its ROW management costs related to the above and other input and will be developing recommendations for new fees as part of an overall City-wide fee review initiative. The new fees will be incorporated into the MTO.

We recommend that a formal ROW management committee be developed that would include key staff members from Public Works, the City Manager's Office, Information Technology, Community Planning and Development Services, and the City Attorney's Office, with liaisons to Public Safety and Community Services and the Finance Office. This committee should initially meet at least once a month to receive input concerning current and anticipated ROW use activity from all pertinent functional areas. This would create a formal review process where information could be shared that would enable all aspects of telecommunications provider use of the ROW to be coordinated for the benefit of both the City's proactive ROW management activities as well as the City's own communications infrastructure use.

Enhancements in ROW management functions related to GIS system implementation and electronic information flow are described in Appendix 6.

Appendix 4

Personal Wireless Services Overview

As indicated in Appendix 1, the Federal Telecommunications Act of 1996 ("the Act") provides the overall framework for local regulation of personal wireless services. Specifically, Section 704 - Facilities Siting; Radio Frequency Emission Standards states:

> a) National Wireless Telecommunications Siting Policy
> *Section 332(c) (47 U.S.C. 332(c)) is amended by adding at the end the following new paragraph:*
> "(7) Preservation of Local Zoning Authority -
> "(A) General Authority
> *Except as provided in this paragraph, nothing in this Act shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction and modifications of personal wireless service facilities.*
>
> "(B)" Limitations
> *"(i) The regulation of the placement, construction, and modification of personal wireless service facilities by any State or local government or instrumentality thereof-*
> *"(I) shall not unreasonably discriminate among providers of functionally equivalent services; and*
> *"(II) shall not prohibit or have the effect of prohibiting the provision of personal wireless services.*
> *"(ii) a State or local government or instrumentality thereof shall act on any request for authorization to place, construct or modify personal wireless service facilities within a reasonable period of time after the request is duly filed with such government or instrumentality, taking into account the nature and scope of such request.*
> *"(iii) Any decision by a State or local government or instrumentality thereof to deny a request to place, construct, or modify personal wireless service facilities shall be in writing and supported by substantial evidence contained in a written record.*
> *"(iv) No State or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions.*
> *"(v) Any person adversely affected by any final action or failure to act by a State or local government or any instrumentality thereof that is inconsistent with this subparagraph may, within 30 days after such action or failure to act, commence an action in any court of competent jurisdiction.*

> *The court shall hear and decide such action on an expedited basis. Any person adversely affected by an act or failure to act by a State or local government or any instrumentality thereof that is inconsistent with clause (iv) may petition the Commission for relief.*
>
> "(C) Definitions - For purposes of this paragraph -
> *"(i) the term 'personal wireless services' means commercial mobile services, unlicensed wireless services, and common carrier wireless exchange access services;*
> *"(ii) the term 'personal wireless service facility' means facilities for the provision of personal wireless services, and*
> *"(iii) the term 'unlicensed wireless service' means the offering of telecommunications services using duly authorized devices which do not require individual license, but does not mean the provision of direct-to-home satellite services (as defined in section 303(v)).".*

Within the context of the Act, decisions may be made by local government with respect to the placement of personal wireless service facilities and with respect to lease negotiations for use of public property. The City has entered into lease agreements with providers including Washington/Baltimore Cellular Limited Partnership, AT&T Wireless PCS, Inc. and Washington, D.C. SMSA, L.P. (Bell Atlantic NYNEX Mobile). Current leases are for the use of City property at the Redgate Golf Course for the placement of towers, antennas, buildings and equipment. Antenna placements on buildings located on private property throughout the City have also been observed.

The City's current entry process is governed by language in the existing City regulations (specifically City Code Sections 25-18 [Heights/Placements on Rooftops] and 25-437 [Screening/Underground Installations]) and the provisions of the lease agreements. While current City regulations contain some specificity with respect to setback, height, rooftop location and screening requirements, supplemental provisions as described and referenced herein could effectively augment existing requirements. Additionally, regulations which address such matters as provider registration, siting criteria, co-location requirements, non/use abandonment clauses and other issues would be beneficial. The leases have many beneficial and substantive sections regarding such issues as compensation, indemnification, technical specifications and termination. Here also supplemental and new provisions such as greater conditions on sub-leases and the potential for in-kind services cold effectively add to existing terms.

Accordingly, a detailed Personal Wireless Service Ordinance with new and supplemental provisions would benefit both the City and providers from a variety of standpoints. By enacting an overall ordinance, comprehensive ground rules would be in place for entities which desire to construct towers, antennas, buildings with powering equipment and other related facilities. Given the auction of spectrum by the FCC to wireless Personal Communications Service (PCS) providers such as Sprint PCS, AT&T Wireless, Nextwave,

Rivgam Communicators, Omnipoint and AerForce Communications, the City could anticipate additional wireless telephony infrastructure in the City. This coupled with the existing rights of wireline providers to provide analog or digital service, means effectively that other requests may be forthcoming for permits and leases for the location of these providers' facilities and equipment.

From a practical standpoint, the City is not required to approve siting wherever and whenever a provider wants it. The City still has a responsibility to safeguard the public interest while not prohibiting or having the effect of prohibiting the provision of personal wireless services. While all providers must not be treated the same, the City must be careful in that it cannot unreasonably discriminate among providers of functionally equivalent services.

There is usually concern regarding siting towers in residential neighborhoods. Location of cell sites, geographic considerations, views, aesthetic issues, flashing lights, noise created by powering units and equipment cabinets and other nuisances all come into play.

Providers have made significant progress in providing "stealth technology" to help hide towers and antennas. These solutions are very creative and include trees, church steeples, and smokestacks to name but a few.

Even with these advances there are still a number of policy related decisions for local government. Some of these considerations include the following questions and potential parameters and resolutions:

1. What type of aesthetic and screening requirements are necessary or desirable?
    a. Use standard requirements already contained in underlying zoning regulation.
    b. Require enhanced screening in residential zones.
    c. Require enhanced screening in all zones.
    d. Require enhanced screening in all zones, but provide flexibility to use existing vegetation or other non-prescribed method to screen.

2. What type of setbacks should be imposed from adjoining property owners and public thoroughfares?
    a. Falling distance.
    b. Standard setback for structures in underlying zone.
    c. Standard setback for structures in underlying zone plus one foot for every foot of height above 60 feet.
    d. As close to the center of the property as possible.
    e. Any of the above with flexibility to move into setback if underlying policy is better served.

3. To what extent should providers be required to check for alternative sites on existing buildings and facilities and within what radius, and what mapping and tower separation requirements are necessary or desirable?
   a. None; map existing facilities; map acceptable locations.
   b. One-quarter to one-half mile.
   c. More or less than one-quarter to one-half mile.
   d. Existing buildings; thirty to fifty feet or higher.

4. What types of color are permissible from a blending standpoint, and does the City want to allow lights, signals and signs on towers?
   a. Blend with architectural character and color.
   b. Prohibit signs, signals and lights unless required by FAA, FCC, etc.
   c. Apply to new or existing facilities?

5. Does the City have a preference for monopolies versus lattice towers?
   a. Aesthetics.
   b. Color.
   c. Located in what zones?

6. With respect to rooftops, what type of coverage should be permissible on the roofs themselves; what type of screening and parapets may be required or allowed?
   a. Preference to sidemounts over rooftops?
   b. Rooftops as close to center as possible.
   c. Rooftops anywhere provided they are screened.
   d. Rooftop antennas of 19' in height or less (so long as they are screened) with no restrictions.

7. Does the City want to create incentives for co-location? Does the City prefer to have a fewer number of towers which are taller or a larger number of towers with less height?
   a. Use of incentives or preferences to encourage or require co location.
   b. Require space on towers be made available to future applicants.
   c. Require towers to be constructed to accommodate co location.
   d. Require demonstration that inquiry was made for use of existing structures.
   e. No policy to encourage co-location.

8. Does the City want a system of preferences guiding the siting of wireless facilities?
    a. Create preferences to public property and other lesser impact locations.
    b. Create preferences to specific non-residential zones.
    c. Create preferences to stealth locations and other non-tower applications.
    d. Create preferences to co-location.
    e. Have no preferences in siting of facilities.
    f. Other?

9. Does the City want incentives established for siting of wireless facilities? What incentives can the City offer?
    a. Establish incentives for siting in non-residential zones.
    b. Establish incentives for establishing non-tower based facilities.
    c. Establish incentives for co-locating.
    d. Other?

10. Does the City want to encourage or create a preference for locating on City property by providing incentives in the regulatory process for expedited review?
    a. Encourage use of public property through an expedited permitting process.
    b. Create preference for the use of public property over other siting choices.
    c. Encourage siting agreements for use of public property.
    d. Identify existing sites compatible for use for wireless facilities.
    e. Discourage use of public property for use by providers for siting facilities.

11. Are there historical, scenic or environmentally sensitive areas which require further consideration and scrutiny?
    a. Historic areas.
    b. Scenic areas.
    c. Environmentally sensitive areas.
    d. Setbacks and design flexibility.
    e. Preferences and alternatives to find alternative sites.

12. What type of permitted height should be permissible in differing zones?
    a. Based upon underlying zoning heights.
    b. Based upon the minimum required to make the system work.
    c. Based upon preferences and incentives.
    d. Allows towers of any height in all zones subject to special or conditional use criteria.

13. Should all towers and antennas require public hearings or should some be permitted with conditional use permits or similar administrative review without public hearings?
    a. Permitted outright.
    b. Require conditional use or similar review.
    c. Require administrative approval.
    d. Variance process.

14. What type of process should provide for abandonment of facilities, in the event that the effective radiated power is reduced, or if smaller towers would suffice as technology continues to improve?
    a. None.
    b. Ninety (90) days.
    c. Six (6) months to one (1) year of non-use plus ninety (90) day removal.

15. What type of sanctions (civil, criminal, revocation of authorizations or a combination thereof) should be provided in the ordinance?
    a. Criminal.
    b. Civil infractions.
    c. Revocation.
    d. Combination.

The Plan and Policy recommends that given the intricacies involved in these decisions, that the City develop a Personal Wireless Ordinance to implement these matters, which in its formulation considers alternative strategies.

During the public meeting with the Planning Commission on January 6, 1999, the above questions were discussed in the context of policy decisions and examples were given of decisions which have been made by other municipalities. As part of the presentation and dialogue, the Planning Commission shared both comments and questions. A general summary of their comments and questions included the following enumerated below. Answers to these questions are also provided below from an overview standpoint and should not be deemed to constitute legal advice which would apply to a specific situation. The totality of such situations and the specific facts involved would need to be reviewed before coming to any definitive conclusion.

1. To what extent can stealth technology be required by the City? Can the City mandate stealth technology or must the cost of same and return on investment for providers be factored into the analysis? To what extent would a reasonable return on investment be a part of this consideration?

Stealth technology would contain many benefits from an aesthetics standpoint. While the issue has not yet seen significant litigation, it is reasonable to assume that if the City were to mandate its usage, but the cost of same and return on investment were not reasonable, a provider could argue that this constituted a barrier to entry.

2. Can a wireless provider provide service to only certain parts of the City or can universal service be mandated by the City?

At this time, we are not aware of requirements whereby universal service can be locally mandated of wireless providers. While universal service requirements and density clauses have been considered with respect to incumbent local exchange carriers and cable television providers, a requirement that a wireless service provider provide service to all parts of the City will likely be subject to challenge.

3. Will the City do an inventory of the providers that are currently deploying wireless services? What types of voice, video or data services do they currently provide?

It is our recommendation that the City conduct a detailed inventory of the providers and infrastructure currently providing wireless services, including numbers and types of towers and antennas. By conducting this survey, the City will be able to better understand the types of infrastructure and voice, video and data services currently being deployed by wireless providers. This will facilitate further analysis as to what types of permitting or other requirements should be imposed.

4. Are wireless service providers currently in compliance with local zoning codes? To what extent will existing or future providers be required to comply with a new overall Personal Wireless Service Ordinance?

As a follow up to the inventory, the City will be better able to ascertain whether all wireless service providers are currently in compliance with local zoning codes and enforce compliance where violations may exist. Absent such an inventory, it will be difficult for the City to know whether zoning code compliance exists. To the extent that existing providers make structural or material modifications to their towers or facilities, we would seek to have them be bound by a new Personal Wireless Service Ordinance. There may be some resistance in this regard. Those entities which currently have a lease may make similar objections. Future providers would be required to comply with the Personal Wireless Service Ordinance from and after the date of its enactment.

5. With respect to the tower located near Interstate 270 and Montrose and other wireless infrastructure located near other areas of the City, within what radius will County areas be included in the existing tower and antenna inventory?

Given the fact that a tower is located near Interstate 270 and Montrose and that other wireless facilities may be located in the County but close to the City limits, we believe that the inventory should include a radius (to be determined) beyond the City limits. The rationale would be that City residents could be affected from aesthetics and other standpoints by these and other personal wireless facilities.

6. Will the Planning Commission be reviewing the Telecommunications Ordinance as well as the Personal Wireless Service Ordinance as they are developed? Will the Telecommunications Ordinance contain right-of-way management provisions?

It is our recommendation (subject to Mayor and Council approval) that the Planning Commission review the Telecommunications Ordinance as well as the Personal Wireless Service Ordinance as they are developed. In the course of our work with other jurisdictions, both ordinances have been submitted for Planning Commission review. While the Personal Wireless Service Ordinance is customarily of more interest to the Planning Commission, the Telecommunications Ordinance will contain a number of right-of-way management provisions that the Planning Commission may be interested in reviewing.

7. Will existing providers be addressing current unresolved problems with respect to location, construction and completion of work involving pedestals, vaults and other facilities?

Existing providers should be addressing any unresolved problems with respect to the above. The extent to which successful compliance is attained can be affected by the backing of the Planning Commission and the Mayor and Council as compliance is sought from the providers. Successful regulatory enforcement typically requires a united front from staff and elected and appointed officials.

8. Does the City have strong authority under the Telecommunications Act of 1996 with respect to zoning matters involving towers, antennas and related facilities? What are the parameters of what constitutes reasonable, competitively neutral and nondiscriminatory conduct?

The City does have strong authority under the Telecommunications Act of 1996 with respect to zoning matters involving towers, antennas and related facilities. The parameters of what constitutes reasonable, competitively neutral and nondiscriminatory conduct are not specifically set forth in federal law. Actions of a number of cities must pass these tests and the facts of given situations must be considered before local decisions and conclusions are reached. There are no easily discernible touchstones in this regard.

9. How many providers of wireless and wireline services can the City expect, given the auction of federal spectrum and potential new competitive local exchange carriers?

Given the auction of spectrum, it is reasonable to assume that there could be eight facilities-based wireless telephony providers (two cellular and six PCS) in Rockville. Regarding facilities-based wireline providers, the City currently has

multiple entrants (Bell Atlantic, CTM, MCI, MFN, etc.) and others, such as Starpower, are expected soon. Additionally, over 40 Competitive Local Exchange Carriers (CLECs, who could be resellers or ultimately facilities-based carriers) have been granted approval at the State level. In addition to the foregoing, there are other video and data wireless providers that could enter the market. Thus at this time, it is difficult to predict just how many providers the City can ultimately expect.

10. How many monopoles will be involved in use? Can the City absolutely prohibit monopoles and towers within residential zones or within a certain distance from residential zones?

The number of monopoles will be dependent upon the number of providers and whether sufficient alternatives exist for co-location and for antennas on buildings. While some jurisdictions have absolutely prohibited monopoles and towers within residential zones or within a certain distance from residential zones, such an approach is riskier under federal law. A better approach may be to enact a wireless ordinance which contains preferences for non-residential zones.

11. Should the City have preferences for location of towers and facilities in certain zones or on City property?

We would recommend that the City have preferences for locations within certain zones or on City property. By creating a preference for City property, the City would not only benefit from the potential revenue stream, but the City would also have more control in the event of abandonment or if a nuisance situation developed. Given Question 10 above, a system of preferences with many alternatives, ranging from City property, several other zones, and then finally residential property, would create a system whereby providers would basically have to pursue alternatives other than residential zones. Even in residential zones, permissible locations can be narrowly defined so long as providers are not effectively barred from providing service in the City.

12. Can the City prohibit lights on towers or develop a framework whereby towers would be shorter than heights above which lighting would be required by the FAA or FCC? Could FCC requirements regarding lighting change over time?

If FAA, FCC or other federal regulations or law requires lighting on towers, the City could not prohibit same since that would be preempted by federal law. The idea of approving towers which are shorter than where lighting requirements become mandatory is a creative idea. However, if providers can prove that taller towers are required to provide services, then such a framework would not be permissible.

13. Could the City provide that no more than a certain number of vertical linear feet of towers could be located within the City?

If the City were to provide that only a certain number of vertical linear feet of towers could be located within the City, and if this prevented current providers wishing to expand their facilities or prevented new providers from entering the market, this could be viewed as being outside of the City's authority under federal law.

14. Could the City construct its own poles or towers and require all future providers to locate thereon? Would the City need to be reasonable in the economics of lease negotiations with respect to such poles or towers?

The operative questions would be: whether such a requirement forced providers to locate in areas which did not satisfy their coverage requirements; or required them to construct multiple facilities when they would not otherwise have to do so; or placed them in a position of having to pay unreasonable rents in order to offer their services to customers in the City. In such instances, providers would argue that such restrictions or requirements were unreasonable.

15. What are some good examples of ordinances adopted in other cities, and what are some examples of more restrictive ordinances adopted in other municipalities?

Ordinances which are adopted by other jurisdictions take many factors into account. The density, topography, view corridors, historical areas and residential neighborhoods are but some of the factors considered. Since we are more familiar with the thought process involved in communities where River Oaks has been involved, we would suggest that communities such as University Place, Washington; Castle Rock, Colorado; and Kearney, Nebraska; would be good examples of ordinances adopted in other cities. With respect to more restrictive ordinances, we would suggest that those be identified and reviewed at a future date so that beneficial provisions therein, and those that could be more readily subject to challenge, be the subject of subsequent discussions.

There were many issues discussed with respect to the above questions and whether federal law would provide guidance or limit the flexibility of the City with respect to these matters. While in-depth discussion on these and other matters would be part of the development of a Personal Wireless Services Ordinance, a general overview is that the City has strong regulatory authority and should develop a more extensive regulatory framework than is currently in place, but in so doing would need to be fair and reasonable and treat providers of functionally equivalent services in a competitively neutral and nondiscriminatory manner. To the extent that a Personal Wireless Services Ordinance is developed, it will provide the extensive framework and ground rules which provide guidance to both policy makers and providers. It will also set forth a basis upon which the citizenry will have further input and knowledge as to the manner in which personal wireless service applications and issues are resolved in Rockville.

Appendix 5

Voice Telecommunications System Report

INTRODUCTION

Indaplex, Inc., independent consultants to the City of Rockville ("City"), Maryland, has performed a review of the City's current voice telecommunications systems and network, in conjunction with River Oaks Communications.

Our analysis has consisted of detailed discussions with City of Rockville staff, Mr. Tom Robinson of River Oaks Communications, an analysis of the City's Bell Atlantic customer service record for account number 301-309-3000, and a facility visit and survey by Robert Johnson, Indaplex consultant.

The results of our review and analysis are included in this report.

FINDINGS

Our review of your present voice telecommunications network has resulted in the following findings and observations.

- The City of Rockville uses two Saturn PBX systems at the City Hall and Gude Drive facilities, manufactured by Siemens Communications. These sites are interconnected with a T-1 line.

  - City Hall has approximately 225 extensions.
  - Gude Drive has approximately 47 extensions.

  The capacity of the City Hall system was recently expanded to accommodate additional extensions. The City purchased this equipment from its communications supplier, Fortran.

  The systems are approximately eight years old.

- A single voice mail system, originally manufactured by Genesis Corporation, provides service to the above mentioned locations, as well as all other facilities. The system is connected to the City Hall PBX system.

- Remaining City facilities have smaller, key telephone systems installed. The manufacturer of the equipment is Tie Communications; the system model is the Onyx system. Extensions from the City Hall PBX are connected to each of these systems.

  - Civic Center has approximately 10 telephones.
  - The Swim Center has approximately 11 telephones.
  - The Lincoln Park Recreation Center has approximately 4 telephones.
  - The Redgate Golf Course has approximately 5 telephones.
  - The water treatment facility has approximately 7 telephones.

  - The Courthouse Square building has approximately 14 telephones installed. The phones were recently purchased, but the common equipment is being reused from other City facilities.

- Voice mail users at the remote facilities are able to access a majority of the features that are available to users at City Hall and Gude Drive.

- Fortran, a local telecommunications equipment vendor, maintains all voice systems for the City.

- There do not appear to be any Centrex services on the Bell Atlantic account we reviewed.

Indaplex also reviewed the billing record of the City's main Bell Atlantic account (301-309-3000). We have attached a detailed summary of this account and have summarized the key points below.

- Monthly costs, for all telephone lines and special circuits, are $5,045, or nearly $60,000 per year. Some key expenditures are for:

  - A T-1 line between City Hall and Gude Drive that costs $450 per month.

  - Fifty-eight "private lines" that run between various City locations. These appear to include alarm lines, off-premise extension lines, tie lines, data lines, and other special services. The combined monthly cost of these services is $2,600. Note that our review indicates that four of these circuits may be charged incorrectly. Circuit numbers 36TLNA55261 through 55264 appear to be tie lines between City Hall and Gude Drive. If these were eliminated when the T-1 line was installed, these charges should be removed and possibly refunded. Monthly costs for these four circuits are $320.

- The City Hall system has the following types and quantities of telephone lines and services (included in the total monthly costs presented above):

  - 21 telephone trunks, installed in the telephone system.
  - 16 Direct Inward Dialing trunks, for the City's DID numbers.
  - 34 regular lines, for modems, faxes, etc.
  - 260 direct dial (DID) numbers.

CONSULTANT'S RECOMMENDATIONS

From our review of your voice telecommunications networks, River Oaks Communications and Indaplex, Inc. are furnishing summary observations on your present voice network and long-term recommendations for its improvement.

Below and following, for your review, discussion and approval, are our findings and recommendations.

EXISTING TELECOMMUNICATIONS SYSTEMS AND SERVICES

- The City and Fortran, your telecommunications vendor, have done a good job designing a citywide voice communications network, despite the age and technology of your installed systems. A consistent level of services and features has been provided to all of the City locations, including voice mail, direct dialing, and uniform extension-to-extension dialing.

  Rockville has done a better job than many other municipalities of a similar size, which typically have a much more confusing combination of systems, features and dialing plans. In many municipal engagements, our clients have multiple voice mail systems, different and incompatible telephone systems, and different methods for reaching municipal employees. While Rockville's voice network may not have some desirable capabilities, the City has developed a desirable level of features and capabilities that can easily migrate to newer systems and technology.

- The City is at risk for a serious failure on its voice mail system. The Genesis voice mail system is outdated and in need of replacement. This system has not been manufactured for a number of years, and the manufacturer is no longer in business. Parts and trained service technicians are very limited. The City has a higher than acceptable risk that this system may experience an irreversible failure, therefore, the City is moving ahead to replace its current voice mail system.

- As detailed later in this Report, quick replacement of just the voice mail system, may present some challenges to the City in the future, since it has to be done before the replacement of the City's overall telephone systems. Essentially, various PBX vendors do not typically sell and support all voice mail systems. Accordingly, in order not to limit its PBX procurement options, the City may face a decision in the future to either abandon the recently purchased voice mail system in favor of a new voice mail system that is supported by the chosen PBX vendor, or keep the recently purchased voice mail system and potentially coordinate service and installation from two competing companies.

  Consequently, the City should consider that the quick purchase of a voice

mail system to solve current problems may be only a short term measure. This will ensure that the City does not limit its future options and that the ultimate voice mail system will be part of an overall system replacement strategy.

- The Siemens Saturn PBX systems have been "manufacturer-discontinued." Although your service provider, Fortran, appears to be providing an acceptable level of support, the City should have some long-term concerns about its present equipment. Discontinued systems typically, over time, result in a scarcity of parts and a shortage of trained service technicians.

- The manufacturer, Nitsuko America, is still supporting the Onyx key telephone systems at your remote sites. This product, however, has consistently lost market share over the past eight to ten years. In fact, Tie Communications, a large distributor of this equipment, declared bankruptcy in 1998. The initial impact on this is not significant to the City, but ongoing support of the systems may become more difficult.

- Year 2000 compliance is also a critical issue with your present systems.

  - The Genesis voice mail system is probably not Y2K compliant. Actual operational impacts of non-compliance will not be known until after 1/1/2000, since there is no supporting documentation on this product.

  - The Siemens Saturn PBX systems were not Y2K compliant at the time the systems were reviewed, according to documents from Siemens Communications. A software upgrade is available; Fortran recently furnished the cost for this upgrade. This upgrade has now been completed.

  - The Tie key telephone systems are not Y2K compliant. Fortran has also provided Y2K compliance status on these systems. However, operational impacts are probably negligible for these systems, if they are not fully compliant. Many organizations are designating non-compliant key telephone systems like these "tolerant," meaning that the systems will not be replaced. Any operational problems are deemed minor and, therefore, "tolerable".

  - The initial, proposed Y2K compliance costs for the patches for the Tie telephone systems are approximately $10,000. Fortran's proposed replacement cost for the voice mail system is $26,000.

- The City incurs a significant monthly cost to Bell Atlantic for services to all facilities. A large amount of this expense is incurred for the "interconnection" of the various facilities, both voice and data. Point-to-

point, private line circuits, which connect your various facilities to each other, cost $31,200 per year. A significant portion of these charges is used to connect the telephone and voice mail systems to the main City Hall system.

- The City presently maintains the core component of system management within its organization, and relies on outside vendors for service and maintenance support. We believe at this time, that the management of the City's telecommunications network is being handled appropriately, based on the following factors:

  - It would not be feasible to rely on the City's communications vendors to deliver the same level of system management and strategic support that is presently provided in the City's administrative support area.

  - By the same token, it would not be financially or operationally feasible to eliminate Fortran's service and maintenance support and self-maintain these systems. Costs would be significantly more to employ a qualified maintenance technician and obtain an adequate supply of replacement parts. Operationally, self-maintenance of these systems is strongly discouraged, even if there were some financial benefits. Due to the age of these systems, the limited availability of parts, and the scarcity of knowledgeable product support, the City is best served at this time by continuing its use of Fortran.

  - Annual maintenance costs of $25,000 to the City's primary equipment vendor, Fortran, are within industry averages for similar arrangements.

  - Due to the age and complexity of the current telecommunications equipment, the City's support staff may currently be devoting more time to reactive system management issues than is ideal. It is very likely that, with new systems, after start-up activities, City staff will be enabled to focus more on proactive telecommunications system management which will, in turn, enhance overall operational efficiency.

SYSTEM AND SERVICE ALTERNATIVES

The City of Rockville will need to aggressively consider a complete replacement of its current telecommunications systems. The City's present systems are manufacturer-discontinued, technologically outdated, and at risk for ongoing serviceability.

Below, we have furnished an initial description of new system objectives and alternatives that can be investigated. These system alternatives could be pursued through a Request for Proposal, at the appropriate time.

- New telephone system technology provides the ability to fully integrate remote sites and establish a fully transparent, citywide telephone system. Remote sites are typically connected to the main system with T-1 lines. Quite often, the costs of the T-1 lines are shared between the voice and data networking needs of the organization. T-1 costs may prove to be expensive, from the incumbent provider. However, other alternatives, including the City's planned fiber optic institutional network, will provide cost-effective alternatives.

- It is technically possible to utilize the planned fiber backbone from the Institutional Network to connect a number of City sites for the voice telecommunications network. Many PBX systems now utilize fiber strands to interconnect remote sites to the main facility. The costs and benefits of this will ultimately need to be reviewed in light of the specific telephone system proposed and accepted through the RFP bidding process. For example, the City may find that it is less costly but less efficient technically to dedicate specific strands of fiber to voice telecommunications equipment. On the other hand, while it is possible to efficiently share fiber bandwidth, the City will need to make an investment in integrated services equipment to accomplish this alternative. Projected costs for various alternatives are presented in other Appendices to the Telecommunications Policy and Plan Document.

- During the design and bidding process, the City should also investigate alternative local service providers for local "dialtone" services, including fax and modem lines. At present, alternative carriers with a service presence in Rockville include MCI Worldcom, Cable TV Montgomery, and MFN. These carriers, plus others that may enter the Rockville market in the near future (Starpower and KMC Telecom, for example), may be a viable alternative to Bell Atlantic for regular local services, as well as other specialized voice and data services. During the bidding process, consideration should be given to the services and capabilities of these companies, as well as Bell Atlantic.

- Although Centrex system technology is a possible alternative to a City-owned private voice network, it does not appear to meet many of your primary objectives. For one, this type of system places more dependence on your local telephone service provider, not less. It will also have higher recurring charges each month, when compared to your current costs. However, Centrex is often a financially viable solution when there are multiple locations, many with a small number of phones. It may be worthwhile to entertain a Centrex proposal during the bidding process, so you can determine if there are any financial benefits to this alternative. At this time, however, the City appears to be better served by pursuing its own private voice network.

NEW SYSTEM OBJECTIVES

- The systems at all locations should operate as one uniform system, with common telephones, features, and user training.

- The systems should be capable of interfacing with the planned fiber Institutional Network, at each City facility where it is available. The main system component will probably reside at City Hall. Connections to the I-Net fiber optic backbone can deliver uniform service to designated City facilities. A "star" topology is required for this type system configuration (with the potential addition of rim trunks to create redundant paths). Preliminary costs for voice and data utilization of the I-Net fiber backbone can be found in another Appendix to the Telecommunications Policy and Plan Document.

- The new systems must have proven and cost-effective "upgradeability" and growth.

- An integrated voice mail system should have common features and operation for users at all sites, including message-waiting lights to encourage prompt responses to voice mail messages.

- Systems in all sites should be sustainable in the event of a commercial power outage, without any downtime.

- Digital telephones with multiple line appearances for most staff telephones should be considered, with the following capabilities:

  – Hold, pick-up and transfer buttons.

  – Two or more extensions on each telephone -- one for primary use and a second for picking-up calls in the department.

  – Secretarial phones with expanded extension capabilities and digital displays.

  – Differentiated ringing on phones to help identify whose phone is ringing.

- An attached spreadsheet presents a preliminary cost estimate for replacing the telephone and voice mail systems. Replacement systems considered in these estimates will include all of the feature requirements listed above.

- City-provided system support and management activities should be proactive and efficient with new system acquisitions. The City should continue to utilize an outside vendor for the warranty and ongoing

maintenance of the new systems. The transition of telephone system management to the City's Information Technology department is an advisable step. Installation of the new telephone systems will provide a significant improvement in "system management tools" that will support efficient management of the City's voice telecommunications network.

STAGING OF NEW SYSTEM INSTALLATIONS

The upgrade and eventual replacement of the City's present telecommunications equipment can be completed in phases, over a two to three year period.

Phase 1 – Y2K Upgrades and Voice Mail System Replacement

Y2K PBX and Key System Upgrades

- Fortran has presented Year 2000 software upgrade pricing for the City's two Siemens Saturn PBX systems and the Tie Onyx key systems at seven other facilities. The combined cost of these upgrades is $10,276.

  The City should contract with Fortran to perform these upgrades during 1999.

Voice Mail System Replacement

- Fortran has presented a replacement option for the City's Genesis voice mail system. The proposed voice mail system is manufactured by Applied Voice Technologies (AVT), which is a leading provider of voice mail systems. The system is an acceptable replacement to the City's current system, and installation should be done in 1999. There will be no sustained ongoing support of the City's present system, and Y2K upgrade options are not available. Unfortunately, it is not known whether the City's present system will have any Year 2000 problems, since it has been discontinued for several years.

- Fortran has certified that, if installed, the AVT system will provide the same customized features, particularly to the Tie key systems in your remote facilities. The ability of providing message-waiting lights at all telephones in these facilities is a specialized, custom program that Fortran has implemented well. The ability of the AVT system to continue this capability is important to the City, during the short-term continued use of the present telephone systems.

- The proposed cost for installing the AVT voice mail replacement system is $26,250.

- In addition to providing the same basic capabilities of the City's present

voice mail system, AVT also provides, for additional costs, all of the enhanced features typical of current voice mail systems. These capabilities include desktop messaging, fax messaging, local-area-network connectivity, and Internet access. However, the City should not invest in these additional capabilities during the initial system installation, for reasons listed below.

- The installation of the AVT voice mail system should not be viewed as a long-term expenditure. The system purchase should be justified strictly as a temporary solution that alleviates the serious service risks of your existing voice mail system.

- It is possible that the AVT system may have to be replaced within the next few years. It may not provide the best possible service to correspond with the new telephone systems that the City will be purchasing in the near future.

  - While the AVT system could coexist with any new PBX system, continued AVT use should not be a bidding requirement for the new PBX systems. This would severely limit the City's choices for new systems and vendors during the bidding process for new telephone systems.

  - If the successful bidder of the new PBX systems is also an AVT dealer, the City should be able to continue using the AVT system with the new PBX system.

  - It is possible that the best choice for a new PBX system incorporates another voicemail choice besides the AVT system. The City could continue using the AVT system, but it would have to deal with two separate service vendors, one for the telephone system and one for the voice mail system.

  - All of these possibilities are best addressed during the bidding process for new telephone systems. In the meantime, the City should understand that there is a possibility that the new AVT voice mail system may not be the best long-term system solution for the City.

Phase 2 – New Telephone System Installation

If financially feasible, the City should bid and replace all current telephone systems at the same time. While a phased installation project is possible, it is not advisable for the reasons presented below.

- A single vendor should install, support and maintain the common equipment and telephones at each facility. The vendor should also be able

to support the voice mail system, which will provide service to all facilities.

- The bidding document needs to encompass all City locations. It is not feasible to seek bids for equipment in some facilities (City Hall and Gude Drive, for example) while excluding the other locations. The successful bidder needs to be chosen for all City locations, not just a selected few.

- A phased system installation could require reliance on two separate vendors to support the City's telecommunications system during an intermediate period. For example, assume the City selected Lucent Technologies as the successful bidder, but first wanted new systems only in City Hall and Gude Drive. The City would conceivably need to continue using Fortran for the other facilities, while Lucent took over service in City Hall and Gude Drive. Capabilities would be lost, and any problems at the remote sites could result in "finger-pointing" between the two vendors.

- If Fortran is the successful bidder, it may be possible to phase the installation of the different facilities.

- After all of these considerations, if the City determines that it is not financially feasible to replace all systems in one fiscal year, it should replace the PBX systems in City Hall and Gude Drive first.

PAYPHONES

A review of the City's present payphone agreements, costs, and revenues has been performed. The purpose of this review was to determine if there are any cost-saving or revenue-enhancing opportunities available to the City of Rockville through new or potential modifications to existing pay phone arrangements.

Present Arrangement

- The City of Rockville has a fairly typical payphone arrangement, when compared to other municipalities. Within this arrangement, payphones have been viewed more as a community service than a revenue source.

- The City has nine installed payphones at its various facilities. Gross annual payphone expenses are approximately $3,600. Commission revenue figures for one phone reduce this annual expense slightly.

    - Six payphones are in areas with light usage. The City pays roughly $50 per month per phone, or $300 per month for all six. Due to the light usage, Bell Atlantic does not provide commissions or reduced rates on these instruments. Bell Atlantic has stated that a payphone must generate between $150 to $175 in monthly revenue before commissions and reduced monthly rates are possible.

    - One payphone, at the Swim Center, has had enough revenue to allow for a commission agreement with Bell Atlantic. The City does not incur a monthly cost for this instrument, and receives a small amount of commission revenue.

    - Two payphones, at the Golf Course, also generate adequate revenue to allow for commissions. At present, there is no agreement with Bell Atlantic, so commissions are not being received. The City, however, does not pay a monthly service cost for either instrument. If an agreement is signed, the City can expect to receive commissions on these instruments, similar to that for the Swim Center payphone.

Options

OPTION #1: Maintain present payphone service with Bell Atlantic, sign as favorable as possible agreements for the two phones at the Golf Course, and continue to expense $2,000 to $3,000 annually for the public service provided by the payphones' availability.

OPTION #2: Seek proposals from alternative payphone service providers with an objective to eliminate annual expenses and increase commission revenues, while maintaining the public service benefits of the payphones.

Recommendation

We recommend pursuing Option #1. The installation and use of private pay telephones can be a risky and problematic undertaking. We do not recommend this approach, unless the City performs a careful assessment of the private company, their equipment, and the rates they charge. The potential problems include:

- A higher incidence of downtime, due to inferior equipment and repair services.

- Less stable vendor and service relationships with payphone providers, long distance carriers, operator services, etc. Corporate takeovers, failures, and mergers occur frequently in this industry, and you will probably see several changes in the companies and agreements you make.

- Extremely high costs for collect and credit card calls. Privately operated payphones typically have higher rates than telephone-company payphones. The desired commission to the property-owner determines these rates. If you select a higher commission percentage, your users will have higher costs. This could be especially sensitive at the Swim Center, where children may make collect calls to their homes. The City would likely be questioned by citizens who could receive potentially a $5 charge on their phone bill for such collect calls.

Privately owned payphones can reduce or eliminate your expenses. However, community service and citizen satisfaction can too easily be sacrificed.

We do not believe the savings benefits justify the potential problems, and recommend that your present arrangement be continued and maximized.

CELLULAR, PAGING AND RELATED WIRELESS SERVICES

A review of the City's present cellular and paging services and costs has been performed. The purpose of this review was to determine if there are any cost-saving opportunities available to the City through new or potential modifications to existing arrangements.

CELLULAR

- The average monthly usage costs of cellular service are not excessive. The average monthly cost per user is only $27.07. There are only two users (out of 99) with bills exceeding $100.
- Base monthly service costs are $3.50, which is a very competitive rate.
- "Cost-per-minute" rates are $.24 during peak usage. These are traditional cellular service rates, and are not as competitive as in the past. Newer, PCS-services (most notably AT&T and Sprint), have rates of $.09 to $.15 per minute.
- Seven Nextel phones are in use, and appear to have a package-pricing plan. These phones are very cost-effective for calls to other City Nextel users. Nextel is not typically as competitive for other types of calls. However, the average cost per instrument is significantly higher than your average cellular instrument. This may account for the apparent overage in the City's monthly cellular budget.

Observations and Recommendations

- As long as the City's average cost per user is $30 to $50 per month, savings benefits from other carriers will probably not be significant.
- Changing service providers may involve a capital investment in new telephone instruments.
- Newer, PCS rates can be less expensive, but typically require a minimum monthly commitment of at least $30 to $50.
- Newer, PCS services should be reviewed, but savings opportunities for the City may not be significant at this point.
- It appears that the State of Maryland has a contract with Sprint PCS. Pricing should be requested and reviewed by the City. If the rates appear to be attractive, a full comparative analysis should be performed to determine if the combination of equipment investment and monthly service expenditures represents a cost savings for the City.

PAGING SERVICES

- The State of Maryland has negotiated monthly rates. The rates are:

  - Statewide, digital $3.50
  - Statewide, alphanumeric $8.95

- National, digital $12.35 to $19.45
- National, alphanumeric $29.95 to $39.95

➢ The City has approximately 69 basic-service subscribers (at $3.50) and 14 subscribers of enhanced services. The average monthly cost per user is $7.69.

Observation and Recommendation

➢ The negotiated monthly rates for these services are competitive and savings benefits from non-State contract carriers will probably not be significant. The rates are not the lowest available but typically lower rates are tied to a large number of organizational users. For example, we have seen national contracts as low as $1.75 for basic services; however, this was for a single organization with approximately 30,000 users.

CITY OF ROCKVILLE, MARYLAND

Budgetary Costs for Replacement Telecommunications Systems

LOCATION	***MFG.***	***TYPE***	***PHONES***	***Low***	***High***
City Hall	Siemens	PBX	225	$146,250	$180,000
Gude Drive	Siemens	PBX	47	21,150	32,900
Civic Center	Tie Onyx	Key	10	4,500	7,000
Swim Center	Tie Onyx	Key	11	4,950	7,700
Rec Center	Tie Onyx	Key	4	1,800	2,800
Golf Center	Tie Onyx	Key	5	2,250	3,500
Water Treatment Center	Tie Onyx	Key	7	3,150	4,900
Courthouse Square	Tie Onyx	Key	14	6,300	9,800
Voice Mail system				40,000	50,000
Cabling			323	72,675	88,825
Total				***$303,025***	***$387,425***

System price ranges
(per telephone)

--- PBX system	$650	$800
--- Key system	$450	$700
--- Voice/data cabling	$225	$275

Costs are budgetary and are based, in part, on the estimated number of telephones at each facility.

Costs at remote facilities could be more, depending on the type of systems installed and their interconnection capabilities with the main sites.

Appendix 6

Data, Video and Other Communications Systems Review

INTRODUCTION

As part of its telecommunications policy and plan development assistance tasks, River Oaks Communications Corporation ("River Oaks") has performed a review of the data, video and other communications systems utilized by the City of Rockville ("City"), Maryland. Our analysis has consisted of on-site review, detailed discussions with City staff, discussions with current and potential equipment vendors and research related to current and potential systems and networks. The results of our review and analysis are included in this report.

FINDINGS

Data Communications System

Our review of the City's present data communications network has resulted in the following findings and observations.

At City Hall a number of systems and users access a 10 megabits per second (Mbps) Ethernet Local Area Network (LAN). The systems and users are tied together utilizing a Cisco Catalyst 1900 Series Switch. The switch has twenty-four 10 Mbps ports and two 100 Mbps ports.

Key interconnections to various systems, equipment and services include the following:

- A Novell File Server is attached to one of the 100 Mbps ports
- An NT Sequel Server for the Permit Plan System utilizes one of the 10 Mbps ports. An older Sequel Server is connected to another 10 Mbps port.
- Access to the IBM mainframe is accomplished through the switch.
- Connections are made to several hubs
- One port is connected to the Eagle Firewall.
- One port is connected to the Web Server outside the firewall.
- Two ports are used for gateways to facilitate message handling and other services.
- Three ports are used for router connections to five external facilities – the Gude Drive Public Works Site; the Senior Center; the Swim Center; the Civic Center Mansion location; and the Community Services Courthouse Square site.
- One port is used for a dial-in router for dial-in connections as necessary from the Golf Course, Water Treatment Facility, and Lincoln Park Recreation Center.
- Two ports are used for direct access by technical staff and for diagnostic purposes.
- There are several remaining ports, including one open 100 Mbps port, for future services, including future hub connections as well as a future GIS Server.

The routers include three Cisco 2501 Series Routers for larger facility connections, as well as an Access Beyond dial-in router. The servers are mainly a combination of Compaq 3000 and 5500 Series units. The system currently has the capability for over 250 individual workstation connections in City Hall.

Regarding remote sites the following data systems are in place.

- The Gude Drive complex is the off-site facility with the most users, supporting approximately 25 PCs at this time, with growth anticipated to 30 or more. The PCs are supported by a 10 Base T Ethernet with a 10 Base 2(thinnet) connection to the garage. The server is a Compaq, running Novell 4.1 (slated to be upgraded to 4.11 shortly). The Ethernet is routed back to the main City Hall facility through a Cisco 1005 Series router, Motorola data service units (DSU) and a leased 56 Kbps, Bell Atlantic Digital Data Service (DDS) circuit.

- The Swim Center, supporting four PCs now with anticipated growth towards six, also utilizes a 10 Base T Ethernet system, with a file server running Novell 4.11. The LAN is connected to a Cisco 1005 Series router. The transmission path back to City Hall is similar to that utilized for the Gude Drive Facility.

- The Civic Center Mansion has a similar configuration to the Swim Center, and currently supports six PCs.

- The Senior Center, with five PCs currently, and potentially between six and ten in the future, has a similar configuration to the three facilities described above except that no file server is present at the Senior Center at this time. Consequently, log-in functions must currently be accomplished through the server located at City Hall.

- The Community Services Facility at 32 Courthouse Square also utilizes an Ethernet LAN and currently supports 14 PCs. These PCs are connected through a hub to a file server and 2501 Series router, which then utilizes a leased 64 Kbps frame relay circuit for connectivity back to City Hall.

At City Hall, there are two standalone systems, including a Hewlett Packard minicomputer used for such functions as water utility billing and parking ticket generation. There is also a Compaq-like server used for connections from applicable users to the signal processor and dispatch monitor functions of the City's alarm system. It runs Novell 3.12 as an operating system and utilizes 10 Base 2 cabling for connectivity.

Large scale UPS (Uninteruptable Power Supply) and backup generator availability is found at City Hall. At remote sites, smaller scale UPS equipment is

available to handle power fluctuations, brownouts, and quick power-down functions in the case of power outages at those facilities.

Category 5 (CAT 5) Wiring is used at all 10 Base T locations. As of July 1, 1998, the County's Department of Information Systems and Telecommunications also standardized all communications cabling inside wiring as CAT 5 indicating that it "universally supports voice, data and video transmissions", and "increases the communications flexibility" of County end users and efficiencies within the County's telecommunications network.

The City data communications staff and their City system users note relatively few problems with servers, PCs, operating systems and associated network equipment. The chief complaints relate to the overall slowness of the system at times, slow response from or inability to access the Internet (covered later in this Appendix) and the features, utility and response of the existing e-mail system.

- The e-mail system is NoteWorks from On Technologies. Various sources indicate that the system is no longer manufactured and there is no current service support for the system. Problems noted by users are many and varied and include:

    - Speed of the current system
    - Reliability of the current system
    - Utility limitations because it is a DOS-based system.
    - No spell check capability.
    - Limited message management functions.
    - Inability to set up user groups.
    - Limitations on file attaching capabilities.

- The City is in the process of reviewing options for a new e-mail system and users have suggested a number of new features that the system should incorporate. These are reviewed in the next section of this Report.

Regarding Year 2000 (Y2K) compliance issues related to the data communications systems, the City has been working to resolve any remaining issues. Some components such as the current Novell Operating System are considered Y2K compliant (the City is waiting for a patch for the Novell 4.1 version operating system used for the Gude Drive file server). The current Compaq servers are considered Y2K compliant and the hubs are considered Y2K tolerant. Some other systems such as the Alarm Services system will need further evaluation related to Y2K tolerance, and the Alarm Services Novell operating system will be changed if required.

Although various systems are individually managed, there is no overall network management of the data communications system (such is found with an HP OpenView system).

Permit Plan

The City utilizes a permit tracking system for tracking applications issuance and related inspections for building, electrical, and plumbing permits. The software is provided by Tidemark.

- The system currently has approximately 70 City users, most in the Community Planning and Development Services and Public Works departments, who access the system from the central Sequel server to their PC's.

- There are varying access security levels, from read-only to those that enable users to make significant entries and updates to the system.

- The system tracks a permit from the time a permit technician enters the data from a perspective permitee's written application, to the time the work is approved.

- The system generates a variety of reports including: The number of permits issued; permit inspection, activity and status; permit revenues generated; permit review time frames; violations/citations issued; and the number of pending permits.

- The system is used by City staff to, in turn, provide review and updates in person, over the phone or through written correspondence to a frequent number of inquiries from various permitee's.

- The system is very data intensive and has crashed on occasion.

Geographic Information System (GIS) Use

Since the fall of 1994, the City has been involved with the Montgomery County Planning Department (MCPD) of the Maryland National Capital Park and Planning Commission (MNCPPC) and other members of a GIS consortium to develop base maps and other topographic layers as part of an overall GIS system. The City developed a MOU (Memorandum Of Understanding) with MCPD and authorized payment of $50,000 initially for the topographic and planimetric mapping project. Another MOU is being developed to authorize up to $25,000 for updating the initial data and for continued maintenance of the database.

- The City has a SUN UNIX work station devoted to GIS activities, which runs ESRI ARCView/ARCInfo software.

- Current maps include a number of property layers; parcel information is available; and a layer matching parcel information with graphic presentation is

planned. Updates to the system are provided to the City on tape. There are quarterly Users Group meetings to discuss issues and upcoming development plans.

- The City currently has one direct connection to the County's GIS system through a link into the County's token ring network utilizing a work station located in the Public Safety area running ARCView. The City, for approximately 6 months, has been able to look at crime trends in a graphic fashion through the use of a Spatial Crime Analysis System (SCAS).

- The County used to do crime trend analysis for the City but now the City is able to do in-depth analysis through the use of the SCAS system. Crime data is entered into a relational database and then integrated into the GIS system through ARCView. Crimes can be spatially plotted, and then both the type and location of crimes can be reviewed on a periodic basis for trends.

- The current connection offers only limited access through the County's GIS system at this point.

- The connection to the County for this GIS application is facilitated by one pair of single mode fiber (part of a six strand bundle) that is connected from the Rockville City Hall computer room to the computer center in the County Office Building (COB). As indicated above, the connection constitutes a logical extension of the County's token ring system for access into the County's GIS database.

- The City currently only has these two work station areas devoted to GIS, but wishes to significantly upgrade current capabilities. For example, the County currently has a GIS Section linked together, and an Intranet developed for web browser–like access by other agencies utilizing ARCExplorer software. Such casual user applications may also be applied to facilitate public access to the GIS system through the Internet at some later point.

- Community Planning and Development Services staff believes that it would be prudent to expand GIS access to additional locations within the City through the use of an ARCExplorer type system including approximately 3 locations in Public Works, 2 locations for Recreation and Parks, 1 additional location for Public Safety and 2 additional locations for Planning. The City also wishes to establish a high capacity, real-time connection to the County's GIS system.

Internet Access

The City's Internet access currently is apparently provided at no cost (except for initial investments in transmission and server equipment) through connections into the County's Library system, which is in turn connected through the County

Data Center via an Ascend router to the Internet Service Provider (ISP) known as Sailor.

- When the connection was initially made it apparently was most efficient to connect City Hall into the Rockville branch of the Montgomery County Public Library (MCPL) and its Ethernet, which is in turn connected back through City Hall to a port on the Ascend router. Other MCPL branches are also connected through the County Data Center to the Ascend router and then all users share approximately 3 T-1 connections to Sailor's Internet access point.

- This means that the City currently shares Internet access with all branches of MCPL, and further shares space with other users on the Rockville branch's Ethernet to gain access to the port on the Ascend router.

- This connection, while cost effective, has resulted in City users experiencing slow response times and unreliable access. It also has resulted in unacceptably slow response times for the general public in accessing the City's website.

City Web Site Development and Use

The City has a wide ranging and informative web site that covers a variety of government information, services and issues. Specifically, the web site provides: City government news; employment information; City services information and citizen service request capability; a variety of information regarding Mayor and Council; City Code information; Boards and Commissions information; materials about City projects; an events calendar; Recreation and Parks information; a variety of reports and publications; a full description of the Imagine Rockville initiative; a City phone directory and e-mail contact list; an overall City profile; and links to the community on-line network called Rocknet.

- The City is currently involved in several initiatives to provide more information and new services electronically via the web site, including on-line registration related to the use of City facilities and amenities and participation in City activities. As noted in Appendix 10, such services are desired by City residents.

- To achieve City and citizen goals for the web site and electronic services, City staff indicates a need for additional manpower, funding, software and an updated web server.

Public Safety Communications

City police work in concert with County police according to long standing agreements, as well as a formal MOU dated June 9, 1997. Under these agreements, the City, like other area municipalities, is tied into the County's

police dispatch system. According to information provided by the City, the County receives all City resident and business 911 calls and responds to the majority of them. The County transfers from one quarter to one third of those calls to the City when the County Police patrols are unable to respond. The City also handles over 1,000 calls per month directly from Rockville citizens for Police service response. Additionally, the City has a direct hotline to the County.

- A review of the City's current connectivity to the County indicates effective linkages, but the current system utilizes equipment that is rapidly becoming technologically out of date. For example, the City's current system employs Computer Aided Dispatch (CAD) to handle and disseminate both emergency and non-emergency requests for service, but call tracking thereafter includes hand filing and hand searching, without adequate ANI (Automatic Number Identification) or graphic presentation capabilities. Additionally, reports from mobile and patrol units, while laptop enabled, utilize stand alone devices that are not linked. Further, reports cannot be completely electronically filed or manipulated. Currently, reports have to be downloaded and reentered into the City's database.

- Concerning both mobile and portable communications, the City is currently tied into the County's public safety radio system. The existing VHS/UHF system is antiquated. Additionally, by rules promulgated by the Federal Communications Commission for the use of existing spectrum, the County, City and other participating municipalities must have a new system in place by 2002.

- For the past 4 or 5 years, the County has been considering an upgrade to a new 800 MHz public safety communications system. This system would include a number of digital channels and be designed to enable a high degree of mobile and portable radio coverage, as well as facilitate a high capacity mobile data system. The County, at last report, is negotiating with a potential contractor to install the new system. The City will have an opportunity to participate in the new system and regardless, must also have new capabilities in place by 2002.

- Whatever path the City takes, it would need to purchase new portable radios, mobile data and voice communications equipment, an upgraded dispatch system, and an upgraded CAD computer. If the City chooses to pursue its own course of action, it would also need to pay for antennas, transmission equipment, tower and other antenna space and interface equipment for compatibility with the new County system.

- Estimates range from $300,000 to $500,000 for a new state of the art City of Rockville Public Safety Communications system, depending upon the types of upgrades chosen and whether or not the City rides on the County system.

Video Communications

The City currently employs video communications to provide information about City government, coverage of City public meetings and promotion of City activities and services through government access television Channel 53 on the Cable TV Montgomery (CTM) system. Programming is produced at City Hall and is transmitted to CTM's headend through a coaxial cable connection. This connection will be upgraded soon to a fiber optic link.

- At City Hall, the City utilizes a variety of studio and field production equipment and post production facilities. A Channelmatic Broadcaster video "jukebox" playback system is used to provide video into the coaxial link through a modulator supplied by CTM. The City utilizes some digital production equipment, such as DVC Pro, as part of its current equipment package.

- In the future, the City indicates a need to: continually migrate towards more and more digital equipment integration; originate both live and taped programming from off site facilities, including the Senior Center and the Civic Center Theatre; and institute greater live, interactive capabilities (such as an interactive phone/audio system within the Council Chambers) and other enhancements.

- Independent equipment funding is available for support of the video communications system from grants provided by CTM. Exact dollar figures are not known at this time, since allocation formulas are still being discussed.

- Regarding reliability and utility of current facilities, the City indicates that the CTM modulator has had problems resulting in the loss of on-air audio and the playback machine is near the end of its useful life, is no longer manufactured, and parts and service support are no longer available.

- Videoconferencing is not currently reported in use by the City. Future potential uses of videoconferencing include meetings with offsite entities such as health organizations and the holding of news conferences with participants able to join in remotely. The primary focus of such applications would be video provided to the desktop level.

- The City also desires to develop video capabilities for its website, in both a live and recorded (on-demand) format.

CONCLUSIONS AND RECOMMENDATIONS

After review of the City's data, voice and other communications systems and networks, River Oaks Communications provides below a summary and conclusions related to the current networks and systems, and recommendations for enhancements to such networks and systems.

Overall Data Communications System

- Upgrade the City's E-mail System – To solve the existing e-mail limitations and reliability, access and response time problems noted in the findings, the City should move as soon as possible to upgrade its e-mail system. When considering features for a new e-mail system, it's important to consider those requested by Departments as listed in Appendix 8. Some of these major enhancements would include: the ability to set up external mail groups; greater file attaching capabilities; shared calendars; remote message access; and the potential for linking with the voicemail system. City staff are currently reviewing the attributes of new systems such as the Microsoft Exchange system, the Novell GroupWise system and Lotus' e-mail system. All of these systems offer significant upgrades to the current system. Besides enabling new features and overcoming existing problems, a quick time frame for e-mail system replacement and upgrade would offset the current lack of service support as well as potential Y2K effects. Potential cost for such a system upgrade and replacement for the City could vary widely depending on the system chosen. The City is reviewing potential costs as part of its overall e-mail review.

- Upgrade the City Hall's Local Area Network to Incorporate Fast Ethernet or Greater Transmission Capabilities – Although enhancements recommended herein for certain systems and network connections such as e-mail, Internet access and WAN connections, should help overcome some current problems related to access and response time, such enhancements will not address all needs related to faster communications speeds. For example, even with improvements in certain systems and connections, the projection for additional uses and users related to systems such as GIS will require a faster backbone network within City Hall. The current Ethernet switch includes two 100 Mbps ports, which enable some high speed access and connectivity. However to truly enable faster connection speeds for every type of system and user, it would be prudent to pursue a system where each segment could operate at 10 or 100 Megabits depending upon the use and the number of users. Therefore, we recommend the following specific upgrades to the City's backbone network:

    - Upgrade the City Hall's Ethernet Switch – A new Ethernet switch such as the Cisco Catalyst 2900 series would enable from 16 to 24 ports to migrate from 10 Megabits to 10/100 Megabits Autosensing Ethernet and Fast Ethernet ports. Two additional ports could be configured for either 100 Base T-copper or 100 Mbps fiber switched uplinks for WAN or other backbone connections. This becomes especially important when looking at the potential for connection to the County's backbone for real time GIS links. The cost for such switch replacement could range from approximately $3,900.00 to $19,000.00 (the 24+2 port configuration is the

most expensive), not including staff and vendor support for system integration and implementation activities.

- Hub Upgrades – To further enable faster communications speeds it would be prudent to upgrade existing hubs to those that are 10/100 megabits configurations, or certainly as new hubs are procured change them to 10/100 configurations. The cost of such hubs for 24 ports is approximately $1,000.00 per hub.

- Upgrade of Some Network Interface Cards (NIC) – Where certain workstations (such as GIS workstations) may need to connect to the network at above 10 Mbps speeds, new NIC cards may need to be purchased. The cost for each NIC card is approximately $50.00.

- Upgrade Data Communications Equipment at Remote Sites – New and upgraded equipment is needed for certain types of systems at the remote sites in order to enable faster speeds for new applications, perhaps additional users at certain sites, and in other cases, faster speeds between remote sites. Specifically:

  - At the Gude Drive facility, the City may wish to pursue an upgrade of both the hub and router to facilitate Fast Ethernet connectivity within the complex, and Ethernet or Fast Ethernet connectivity to City Hall (requiring dual Ethernet or dual Fast Ethernet router connections – one to the hub and one to the transceiver) which will in turn enable applications such as high capacity sharing of GIS information between Public Works locations. The cost for such upgrades would be approximately $1,000.00 for the hub and $2,700.00 for the router/access device upgrade. If such an application is not developed, then the City may be able to use the existing configuration connected through the anticipated I-Net fiber connection with the addition of a higher speed interface and a fiber-based transceiver. The projected cost for such transmission devices is included in Appendix 7 concerning I-Net transmission.

    Concerning the Senior Center, the existing interface configuration could work well with the addition of a higher speed interface and fiber transceiver electronics in place of the current Motorola DSU, unless full Ethernet LAN to LAN connectivity is needed. In this case, similar to the above, a new router with dual Ethernet connections would be needed; potentially similar to the one needed for the Swim Center as described below. The projected cost of fiber transceiver electronics is covered in Appendix 7.

  - Concerning the Swim Center, the existing configuration would need enhancement in order to utilize the capabilities of the I-Net data-over-cable link. This would include a new router that would facilitate dual Ethernet

connectivity (one connection to the hub and one connection to the cable modem), as well as the addition of a cable modem. The router could potentially be similar to the Cisco 1605-R series, which costs approximately $1,900.00. The cost for the cable modem is covered in Appendix 7.

- The Civic Center's needed configuration would be similar to the Senior Center.

- The Community Services configuration also would be similar to the Senior Center and Civic Center.

- The Golf Course Pro Shop would need the addition of an Ethernet NIC card in the existing PC and a cable modem.

- The Water Treatment facility would need Ethernet NIC cards for each PC, perhaps a small hub, and the cable modem.

- The Lincoln Park Recreation Center would need an Ethernet NIC card for each PC, perhaps a small hub and the cable modem.

- Projections for the Twinbrook Recreation Center would include an Ethernet NIC card for the PC and a cable modem.

In order to facilitate operation of the cable modem system and enable full Ethernet connectivity across the fiber WAN, the current Cisco 2501 routers at City Hall would need upgrading to multiple routers with dual Ethernet port configurations (potentially including one with Fast Ethernet connectivity). The cost would range from approximately $1,900.00 to $2,700.00 each. Alternatively, the City may wish to consolidate many of the functions of the current 2501 Cisco routers at City Hall into a larger router such as a Cisco 3600 or 7200 series which would handle a variety of inputs from a variety of sources and expand future routing possibilities. Such a router would cost approximately $8,000.00 to $11,000.00.

As an alternative to data-over-cable, the City is exploring obtaining fiber connections to additional sites through agreements with other providers.

- Implement an Overall Network Monitoring and Management System – With the advent of new and additional equipment, users and applications, it would be useful for the City to implement an overall network management system facilitated through a program such as HP OpenView, integrated with vendor monitoring and control software such as CiscoWorks. The cost for a program like OpenView would begin at approximately $5,500.00, with additional cost for specific modules such as the Netmetrix module for wide area network

oversight and diagnostics, RMON2 LAN probes, etc. The cost for the NT version of CiscoWorks could be approximately $7,000.00.

It is important to note here, that such a management system, in association with current vendor support and potential use of certain outsourced system integration and maintenance resources, could help offset otherwise potential necessary increases in data communications operations staffing levels as the system may grow.

Permit Plan System

- Expand the Utility of the Permit Plan System – With the advent of the new server and upgraded software from Tidemark, the Permit Plan system apparently would be capable of internally facilitating electronic transfer of Recreation and Parks registration information, ROW permit status tracking, and similar services. Additionally, although City staff is very wary of exporting the data electronically or allowing electronic filing of permit requests based on potential security breaches, the utility and security aspects of such should be reviewed with Tidemark to determine feasibility and costs since such applications would be useful for citizens and businesses alike.

GIS System

- Upgrade Support for GIS Development – The City should devote at least one full-time resource in the Community Planning and Development Services Department beyond current resources to enhance and increase utilization of the system.

- Implement Broader Delivery of GIS to Desktop Locations – The City should provide, through a central gateway in Planning, access from a variety of other departments, as indicated in the Findings Section of this Appendix, to GIS information, at least in a browse and inquire fashion. This will require additional software and hardware resources currently estimated at approximately $17,000.

- Develop a High Capacity Link to the County's GIS Database – For maximum utility and information sharing related to both City and Region-wide GIS applications, the City, through expanding its internal network in City Hall and its wide area network (WAN) connections, should develop real-time access to the County's GIS Database. Discussions with the County indicate that the most efficient and effective connectivity would be accomplished by the City gaining access to the County's backbone network. In order to do this, the City would potentially need to develop an ATM uplink to the County's Fibernet backbone (this is how some County GIS users are connected to the GIS Database). This could be accomplished using either a separate edge switch or an uplink connection on the router. This would provide both the speed and

connectivity, both internally and externally, that would be needed for the most effective GIS system access. Besides the cost mentioned earlier for upgrading the LAN within the City, an external edge switch, if needed, would cost approximately $22,500.00. The City should be able to use an existing pair of fiber currently used for connection into the County's Token Ring network, by reconfiguring Police GIS access through the proposed Planning gateway. An additional firewall may also be needed for such access, currently estimated by the County at approximately $15,000. This cost is still being investigated with the County.

Internet Access

- Upgrade Access Capacity to the Internet for City Users – The City should follow several steps in developing a higher capacity connection to the Internet:

  - First, the City should investigate the LAN and WAN upgrade plans of MCPL. The preliminary information is that the Libraries are preparing to upgrade their LAN/WAN system for faster speed connections. It is possible that the combination of this upgrade, along with the proposed City LAN/WAN upgrade, would facilitate faster access to the Internet. The bottleneck may still be with shared use of one port on the Ascend router (even though the County indicates that Sailor recently upgraded the capabilities of the router).

  - Alternatively, the City may be able to gain access to its own port on the router which could facilitate better access to the Internet. Again, a bottleneck may exist by the shared use of the multiple T-1s to Sailor's Internet access point.

  - Ultimately, the City may need to develop with Sailor its own dedicated access to the Internet, or develop such access with another provider. For example, as part of its pending agreement with Starpower, it may be able to gain high speed, cost effective Internet access through Starpower's ISP. Current preliminary estimates for T-1 access for the City through Sailor or another commercial provider (if, for example, agreement could not be reached with Starpower) would be approximately $1,000 per month. Even though significantly higher than current costs, it would be a relatively small price to pay to increase response time and consequently the utility of the Internet for City users.

Web Site Development and Expansion

- Support Web Site Development with Additional Resources – The current Web Administrator performs a variety of functions and therefore may not be able to focus totally on the wide range of tasks needed to more fully develop the

City's Web Site. Discussions and observations also indicate that additional space, and upgraded web server software and development tools would be beneficial in providing an expansion of services. Such services are indicated as beneficial by the residential community, as discussed in Appendix 10.

- Upgrade Services Provided Electronically – Specific services that the City should focus on for electronic provision include:

  - Online registration and payment for a variety of City activities, especially those sponsored by Recreation and Parks.
  - Online permit applications filing and tracking.
  - Expanded e-mail contacts with City staff, including copies of requests to the Citizen Service Coordinator for coordination and oversight.
  - A special section devoted to new residents (a type of electronic "Welcome Wagon"), which would include links to other pertinent sites (such as Schools, Libraries and other services).
  - Online surveys, including result tabulations – This would also require companion relational database software to manipulate the data and generate reports.
  - A gateway into the web browser version of GIS for map access.
  - The capability for video importation, both live and recorded, to support written record information.
  - Implementation of threaded discussion groups on public issues of high interest, and
  - A more powerful search engine to get citizens quickly to the information they need.

In relation to the above, the addition of significant security software, as well as perhaps additional firewalls, will be necessary.

As the City begins to expand services provided electronically, and correspondingly is entrusted with a greater amount of citizen data, the City also should prepare and post on-line on its website a Citzen Data Safeguards Policy. At a minimum, this policy should explain in detail to citizens:

- What information is automatically gathered by the City's website (e.g., number of "hits," domain names, etc.), for what purpose it is gathered, how it will be used, and which, if any, other organizations it will be shared with.
- What information the City's website enables a citizen to provide (E-mail addresses for correspondence purposes: future provision of citizen address and payment information for class registrations; etc.) and who has access to such information once it is filed.
- How the City specifically safeguards data entrusted to it by citizens.

Public Safety Communications

- Upgrade the City's Public Safety Communications System – The City should move as soon as feasible to upgrade both its dispatch center and its mobile and portable radio communications. Internally, the City has recommended development of an internal task force with perhaps the use of outside Public Safety Communications consulting services. We believe that this would be a prudent move, but time is short. Accordingly, the City should move quickly in this area so that one of two options could be chosen in concert with the County's current activity related to a new 800 MHz system:

    - If the County moves forward quickly with a new 800 MHz public safety radio system, we would recommend that the City take the opportunity to upgrade along with the County and utilize the new system. As indicated in the findings, this would require significant new dispatch, mobile and portable equipment; however, such equipment is currently in need of a significant technological upgrade regardless.

    - If the County does not more forward quickly, then the City may wish to consider other options including the use of its own system as long as future compatibility with the County system can be accomplished in a cost effective manner. It is estimated that compatibility issues could require a significant additional expenditure by the City over integrating with the County's system as it moves forward; however, based on the County's slow activity to date, movement on its own may enable the City to upgrade its communications capabilities in a quicker timeframe and provide more efficient services for citizens. The City also may want to investigate the possibility of leasing equipment during an interim period.

Video Communications

- Migrate its City Video Communications Production, Post Production Transmission and Reception Equipment to Digital Electronics over the Next Several Years – The field of television is moving inexorably towards an all-digital realm, with analog broadcasting scheduled to be phased out by 2006. The City already includes some digital production equipment in its communications system. Over time, the City should migrate all of its equipment to digital electronics. The funding for such can come largely from grant money allocated through cable franchise and other agreements, although some of the grant money is needed for replacement and new equipment not directly related to the digital conversion. There is, then, a potential additional need for funding depending on the ultimate amount of funding available from current and pending agreements.

- Initiate Transmissions from the Senior Center, Civic Center Theatre and Potentially Other Remote Sites – With the I-Net capabilities being installed,

the fact that citizens are highly interested in the activities sponsored by the City and the City's existing and projected production capabilities, it would be beneficial to citizens to provide remote cablecasting. The WAN connection equipment for such transmissions is covered in Appendix 7. The production equipment needed again will be covered by grant or additional funding as discussed above.

- Monitor the Need for Videoconferencing – Some potential beneficial uses of videoconferencing were expressed in the departmental and business survey and focus group results. While there is currently not a large outcry for videoconferencing , the City should consider implementation of videoconferencing capabilities in two fashions over time:

  - Desktop Videoconferencing – With expansions in LAN/WAN capacity, as well as improvements in desktop videoconferencing technology, it is likely that beneficial uses will arise and the City should have some capabilities in place to take advantage of videoconferencing applications, as mentioned in the Findings Section of this Appendix.

  - Videoconferencing Center for Community Applications – As described in Appendix 11, City businesses indicate some central videoconferencing capabilities would be useful, especially for small business and community organizations, who may not have either large scale or desktop videoconferencing capabilities for quite a while. The City may wish to explore the use of future video capabilities for such videoconferencing activities. To do so, would require either a compressed or high capacity video link out from City Hall, or access over a WAN and gateway connection to uplink facilities. It would also require the City to access satellite receive programming at a downlink facility.

  - Staffing – The staff devoted to video communications are also devoted to overall cable and telecommunications regulation and oversight, as well as implementation of government access television and I-Net services. Based on the level of activity projected for these functional areas, as well as for video communications in general, it is likely that additional staffing will be necessary to implement pertinent Action Steps of the Policy and Plan.

Wide Area Network

- Expand Transmission Capacity Between City Sites – With the potential for the use of the I-Net and higher capacity, lower cost competitive WAN connection services the City should move to take advantage of such networks and services now and in the future:

- We recommend that the City first pursue implementation of services over the Institutional Network, including both end-to-end fiber connectivity as well as use of the supplemental I-Net's data over cable connectivity. This is further discussed in Appendix 7.

- Down the road as technology may change and cost/benefit analysis proves more beneficial or cost effective than the supplemental I-Net, the City may wish to consider digital subscriber line services and other leased transport services for future connectivity in place of data-over-cable services.

- Enhance City Connections to Other Organizations – Various City Departments desired enhanced connections to other government agencies and organizations. Where such connections cannot be accomplished through the Internet, once the City's LAN/WAN facilities are upgraded, the City may wish to pursue discussions with such other agencies and organizations to determine if direct connections are feasible.

- Continue to Monitor Interest in the Use of Telecommuting and Teletraining – The City's expanded LAN/WAN facilities, in conjunction with an increase in network and service capacity for the residential community, certainly will increase capabilities and lower costs related to the use of telecommuting and teletraining applications. As demand may increase over what was discovered in this review, the City should have the capabilities in place to facilitate such uses at that time.

A summary table of network upgrade costs is presented below.

DATA, VIDEO AND OTHER COMMUNICATIONS SYSTEM UPGRADE COST PROJECTION SUMMARY

Data Communications

Major Components	Low Range	High Range
City Hall Switch	$3,900	$11,000
Hubs	$4,500	$9,600
Routers	$3,800	$19,400
NIC Cards	$1,500	$5,000
Network Management Software	$12,500	$19,500
GIS System Upgrades	$17,000	$19,000
Edge Switch – GIS	$20,000	$25,000
Firewall – GIS	$15,000	$20,000
Total	$78,200	$128,500

Note: The above does not include approximately $12,000 annually that may be needed for enhanced Internet Access, or $25,000 that may be needed for payment to MCPD for overall GIS database updates and maintenance. The above also does not include funding for software and hardware that may be needed to protect the privacy of information provided by, and obtained from, citizens electronically, and that may be needed to protect the integrity of information, systems, and databases the City maintains and provides electronically.

Public Safety Communications

State of the Art System	$ 300,000	$ 500,000

Video Communications

Note: Some yet to be determined funding may be needed additional to grant funding.

Appendix 7

Institutional Network (I-Net) Use For The City of Rockville

INTRODUCTION

As part of the Cable Franchise Agreement between SBC Media Ventures, L.P. and Montgomery County, ("County") Maryland and participating municipalities including the City of Rockville ("City"), related to the operation of Cable Television Montgomery (CTM), the City will be provided access to both a fiber-based Institutional Network (I-Net) and supplemental Institutional Network services as described in Section 7 and Exhibits B and F of the Franchise. The potential uses of the I-Net were further delineated in Agreements between the County and the City dated November 23, 1998.

Essentially, the Franchise Agreement and the Agreements between the City and the County enable two types of I-Net connectivity. First, CTM is required to provide and install, at no cost to the City, fiber optic cabling to City Hall, the Civic Center Complex including the Glenview Mansion and F. Scott Fitzgerald Theatre; the City's Public Works Maintenance Facility on Rothgeb Drive (also known as the Gude Drive Facility); the Rockville Senior Center; and the Public Safety and Community Services Facility at 32 Courthouse Square. The City is responsible for maintaining this fiber optic infrastructure once in place. However, CTM is required by franchise to have maintenance and repair technicians available for both routine and demand maintenance and service repair. Under the Franchise Agreement, CTM would be paid by the County (and assumedly participating municipalities) a total amount not to exceed $10,400 per year, adjusted annually by the CPI, for assuring two hour technician response at all hours (although not finitely determined at this point, the City's share of this cost could be projected at approximately $700.00). Additionally, once on-site, the initial rate for emergency maintenance/repair service is $65.00 per hour, per person. Once service is repaired any work performed by technicians beyond such time would be at a rate of $50.00 per hour, per person, which may be adjusted annually by the CPI.

Once properly installed and tested, though, the fiber system is anticipated to be highly reliable, at a potential network availability rate of 99.99% (equating to no more than 53 minutes of downtime maximum on an annual basis). Accordingly, it is projected that the City's fiber optic link maintenance cost beyond the minimum per year would be minimal.

Second, as two way interactive data communications services are made available by CTM in its franchise area (and Rockville is projected to be one of the earliest upgrade areas, potentially beginning in 1999), CTM is required to provide supplemental I-Net services through its data over cable network to the Rockville Swim Center, Water Treatment Plant, Lincoln Park Community Center, Redgate Municipal Golf Course, Twinbrook Park Community Center, and other municipal buildings as designated by the City. At last discussion with the County, there would be no service, modem equipment or modem connection charges for such services. If modems ultimately need to be procured, the cost for such are described later in this Appendix. Detailed discussion follows related to both the potential use of the fiber-based I-Net, as well as the supplemental data over cable I-Net services.

DISCUSSION

Fiber-based I-Net

The fiber optic I-Net will provide six strands of single mode fiber to the sites previously designated by the City. The majority of the fiber is planned to be an incremental portion of a larger bundle which is being installed as part of the overall upgrade/rebuild of the current CTM system. A preliminary routing was provided from CTM to the City on December 15, 1998, but had incorrect locations noted. Additionally, the preliminary routing is shown from CTM's current head-end location, which is being moved from the center of the City to a location near Gude Drive and Route 355. As of the most recent discussions, the County's engineering consultant, Columbia Telecommunications Corporation (CTC) is working with CTM to develop a correct routing plan.

At each facility, the ultimate use of either an integrated or separately transmitted service architecture will determine where the fiber should be routed once entering the facility. For example, if an integrated services architecture is chosen, then once the fiber arrives at City Hall, all six strands could be terminated in the lower level data communications room into a patch panel using standard connectors such as SC or ST. If however, a separate delivery approach was chosen, then two strands of fiber each could be taken to the data communications room, the phone switch room and the video transmission facilities respectively.

The service delivery concept chosen ultimately depends upon a variety of factors including cost; network topology; ultimate nature, type, speed and capacity of services to be delivered; and the ease of integration of such services. Below we describe two potential network architecture options to effectively utilize the I-Net fiber infrastructure to provide the types and levels of services indicated as needed by the Departmental needs assessment.

Fiber I-Net Star Topology

This concept most closely emulates the current voice and data network topology, while cost-effectively replacing leased lines and increasing service, speeds and capacity. Essentially, the six strands of fiber would be routed such that they form a logical star from City Hall to the four outlying facilities. Specifically:

- At the Senior Center, implementation of the I-Net would replace current OPX lines and the 56 Kbps DDS circuit with a minimum of 10 Mbps data communications connectivity and at least one T-1 connection for voice. Additionally, a video connection would be available for the first time.

  If the services are fully integrated, all fibers could be terminated in the phone closet for access to the I-Net. For non-integrated services, the fibers for data and voice services could again be terminated in the phone closet while fibers for video would be extended to the room primarily used for program origination.

- At the Community Services Courthouse Square facility, installation of the I-Net would eliminate the current data frame relay circuit as well as the OPX lines for voice system connectivity. No video origination is planned at this time. For both integrated and non-integrated services all fibers could initially terminate in the phone room.

- At the Gude Drive facility, I-Net installation would eliminate both the current T-1 utilized for voice connectivity and the 56 Kbps DDS circuit utilized for data communications. For non-integrated services, two fibers could be terminated at the phone cabinet location in the main facility while the remaining fibers could be terminated at the data cabinet in the same facility. For integrated services, all fibers could be terminated at the data cabinet location, although observation indicated that a more secure cabinet may need to be installed.

  Additionally, a copper based LAN connection (perhaps 10 Base 5) needs to be installed from the main facility to the Golf Course Administrator's office in order to bring that function into the Gude Campus LAN.

- At the Civic Center facility, installation of the I-Net will replace the existing 56 Kbps DDS circuit as well as the OPX lines for current data and voice connectivity. If integrated service delivery is chosen, then all fibers could be brought to the phone closet in the Glenview Mansion's basement. However, either a fiber or copper connection would need to be made between the Mansion and the Theatre. Alternatively, for the delivery of non-integrated services, or integrated data and voice and non-integrated video, two fibers could be delivered to the F. Scott Fitzgerald Theatre for the origination of video programming, while the remaining four fibers are delivered to the phone closet in the Mansion.

- Based on provisions in the franchise agreement, there will also be a dedicated video connection between City Hall and CTM's headend for the delivery of all Channel 53 programming to the headend.

Integrated services can be advantageous in that they efficiently use a limited amount of fiber, allowing remaining fibers to be used for an expansion of services as well as potential redundant operation. Completely non-integrated services would use all of the six fibers available (two for voice, two for data and two for video), unless more expensive Wavelength Division Multiplexing (WDM) transmission technology is used, which would enable a single fiber to be used for each service. The transmission equipment for non-integrated services also tends to be less expensive at remote sites, since common logic electronics are not needed for multiplexing functions and services such as video could remain in an analog format, thus not requiring digital video compression technology to be employed. At the main site (City Hall), however, depending on the configuration used, multiple transceivers may need to be employed (one for each remote link) which can drive up the cost at the main site. There would also

be some savings with integrated services equipment that utilize one power supply and one chassis for necessary transmission equipment. However, any reliance on common electronics such as power supplies means that a problem with such electronics would effect the delivery of all services.

Overall, delivery of non-integrated services could be accomplished at remote sites for up to $2,000.00 for each voice link (including up to two T-1's per site); from approximately $2,000.00 to $5,500.00 for 1.54, 10 or 100 Mbps data links; and up to $3,500.00 for each of the two contemplated analog video links. At City Hall, costs could range up to $8,000.00 for the voice links, up to $10,000.00 for the data links and up to $7,000.00 for the two video links.

Integrated services in the star topology would range from $7,000.00 to $10,000.00 at remote sites for 10 or 100 Mbps data communications connectivity and two T-1's for voice connectivity. The addition of integrated, digitized, video communications could range up to $10,000.00 for broadcast quality transmission equipment, per remote site. At the main City Hall site, where all communications would be consolidated, voice and data integration equipment cost would range from $9,000.00 to $20,000.00, with the addition of costs ranging up to $20,000.00 for the two video links.

Figure 1, a (not to scale) diagram of a potential star configuration for City fiber I-Net infrastructure use is found later in this Appendix.

Ring Topology

In the potential ring topology configuration, the six strands of fiber would be routed from City Hall to the remote sites in a ring configuration. For example, current network information from CTM is that the ring most likely would be constructed from City Hall to Community Services; then to the Senior Center; then to the Gude Drive facility; then to the Civic Center; then back to City Hall.

Use of a ring topology would require use of either standards-based integrated transport technologies such as SONET (Synchronous Optical Network), ATM (Asynchronous Transfer Mode), or ATM over SONET, or a similar proprietary technology. The advantages of a ring topology include efficient integration of voice, data and video services on just a single fiber pair and implementation of a network with high reliability and network availability (perhaps up to 99.999% network availability, or less than six minutes of network downtime anticipated on an annual basis). This is because additional fiber strands available from the remaining four in the bundle can be utilized to make the network bi-directional, and electronics can be implemented to make it self-healing and always active in both directions, so that a cut cable anywhere in the fiber loop would not bring services down. Instead services would operate in the other direction over the ring.

Disadvantages of the ring topology are its cost of implementation and that the link distance is lengthened for remote sites on the opposite side of the ring from City Hall. Specifically, depending on the nature, speed and capacity of the transport technology utilized, the cost per remote sites without video communications could range from

$14,000.00 to 32,000.00, and with video communications from 22,000.00 to $40,000.00. The cost at City Hall could range from $30,000.00 to $60,000.00, including video communications.

Regarding connectivity back to City Hall from various points on the ring, depending upon the ultimate ring architecture sites such as Senior and Gude could have a significantly longer transport distance to City Hall than under the star topology, based on the hops that would need to be made through other facilities. In discussions with Indaplex (who worked with River Oaks Communications on the voice telecommunications systems review) such lengthy, multiple transmission device paths can create transport problems for PBX-oriented telephone systems.

There is also still a question until a corrected design is received from CTM, relating to whether the fiber paths needed to establish the ring would be consistent with the fiber paths planned by CTM for the fiber portion of its HFC residential network, such that the fibers could be obtained as incremental infrastructure from its overall bundle.

Figure 2, a (not to scale) diagram of a potential ring configuration for City fiber I-Net infrastructure use is found later in this Appendix.

Supplemental I-Net Data Over Cable Services

The cable franchise and related agreements stipulate that the City would be provided with data over cable services to the facilities not connected with the fiber-based I-Net, as such services are rolled out to residential subscribers in Rockville. The franchise provides for 2 Mbps of bandwidth to be provided on a per-data channel basis, for shared cable modem connectivity to create a VLAN environment for County and participating municipality locations. Subsequent connections through the CTM headend and back (perhaps through the County's Data Center) to City Hall would enable connection of these data over cable locations back into the overall City Wide Area Network.

According to CTC, the system is set-up initially as one large 2 Mbps broadband Ethernet to be shared by up to 100 cable modem connections. However, the HFC system is segmented such that as the traffic load over the shared system may became problematic, segmentation in the network could be developed to enable frequency and bandwidth reuse, such that only a few facilities off of any given segment would share a separate 2 Mbps of bandwidth.

Based on system upgrade plans, it is likely that Rockville's municipal facilities could be some of the first supplemental I-Net users and therefore would not initially experience network slowdowns. Additionally, the up to 2 Mbps of available bandwidth would be a significant improvement over current dial-in and 56 Kbps DDS circuits. However, as additional users may come on board, the City may wish to have in place with the County and CTM a concrete plan to segment the system so that the number of users for any given shared bandwidth could be minimized.

According to CTC, the modems currently envisioned for use are Com21 cable modems. Like many vendors, Com21 currently has proprietary data over cable technology that is reportedly working very well in system implementations throughout the country. Com21 is also one of the vendors who have developed a DOCSIS (Data Over Cable System Interoperability Specification) compliant modem, such that it would have the most advanced features and interoperability with other vendors' data over cable products. Like many vendors, the Com21 DOCSIS product is currently under testing with CableLabs, the cable industry's research, development and testing laboratories.

The cost for the next generation of cable modems is not finitely known at this time, however, current cable modems cost from between $500 and $2000 each, depending upon whether connectivity is designed for a few PC's or for a large scale Ethernet LAN.

Both figures 1 and 2 include a potential configuration for I-Net data-over-cable site connectivity.

CONCLUSIONS AND RECOMMENDATIONS

While the City will need final details related to both the fiber-based and data over cable I-Net architectures, based on information available to date, we would recommend that the City pursue the following I-Net implementation as the major backbone component of its Wide Area Network:

- Fiber-I-Net Star Topology, with Potential Rim Trunks, Implementation – The City should pursue implementation of the I-Net in a star configuration, with the potential for the addition of rim trunks, perhaps through other regulatory agreements such as the pending agreement with Starpower. Specifically, the star topology would be less expensive to implement initially; would more closely follow existing topologies (and therefore provide for faster implementation); and would provide a significant increase in network capacity, plus the initiation of new services such as video origination.

  If constructed properly, we believe that the system could achieve a 99.99% availability rate which would significantly reduce concerns about a lack of alternate network paths. If concerns arise, then the addition of the aforementioned rim trunks could create a migration path to a multiple ring topology. One important point concerning such a migration strategy: without the final network routing design from CTM, it is not known at this time whether the star links would use diverse paths to each remote location from City Hall (i.e., the last 1000 feet of the runs from Community Services and the Senior Center to City Hall could potentially be collocated). Implementation of rim trunks without fully diverse routing would not solve all redundancy needs.
  Regarding equipment, we would recommend that transmission equipment that integrates voice and data services be utilized initially, if key components potentially subject to failure such as power supplies are incorporated in a redundant manner. While this is anticipated to be more expensive than some

configurations for separately transmitting voice and data services, it would allow for modular upgrades to enable redundant pathing at the time such may be accomplished through the implementation of rim trunks. Alternatively, the City could implement voice and data services on separate cables using completely separate components. Regardless, we recommend that video services be implemented from the Senior Center and the Civic Center Theatre on a separate pair of fiber using a lower cost analog format in the beginning, with migration to digital equipment over time.

The projected cost range concerning transmission equipment for the recommended fiber implementation is included in the table at the end of this section.

- Data Over Cable Service I-Net Implementation – We recommend that the City initially utilize the data over cable services provided by CTM for its other remote sites for data communications connectivity. Initially, to avoid routing through the County's data center, since it would both elongate the path and create another system integration point, we recommend that the service be accessed either by a cable modem at City Hall which would be part of the overall data over cable I-Net, or if such can be negotiated with CTM, through a direct fiber connection from CTM's router to a router at City Hall.

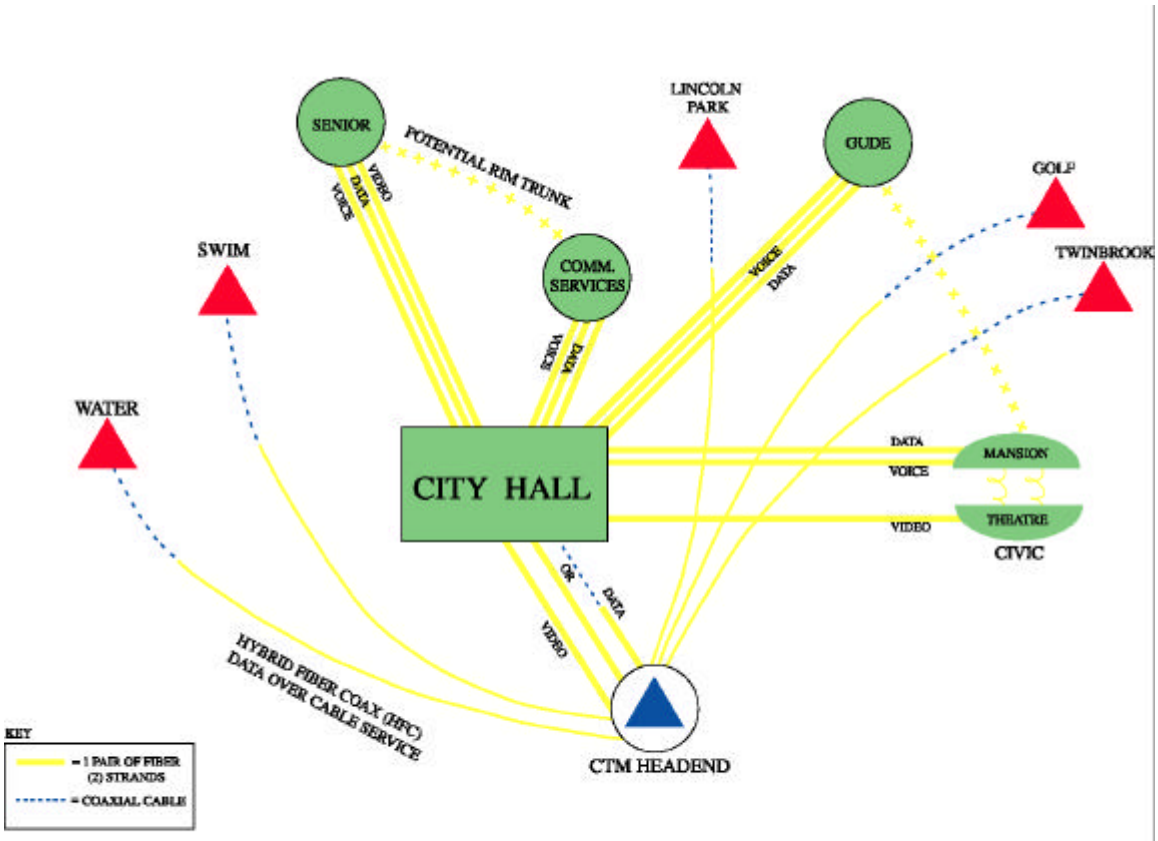
  We further recommend that the City develop a plan with CTM to further segment the data over cable I-Net as data traffic congestion may cause a slow down in network response in the future.

  The cost for such implementation is currently anticipated to be at no charge for service, service connections and cable modem provision. If this scenario changes, we have anticipated potential equipment cost in the table at the end of this section.

  Until Internet Protocol (IP) voice services develop further technologically where such can be efficiently and effectively integrated with PBX-based services, and are proven services using data over cable transport, we recommend that the voice telecommunications system continues to use the present voice connection arrangements to the locations receiving data over cable services, with an eye toward the use of potential competitive telephone carriers for voice links to these sites in the future.

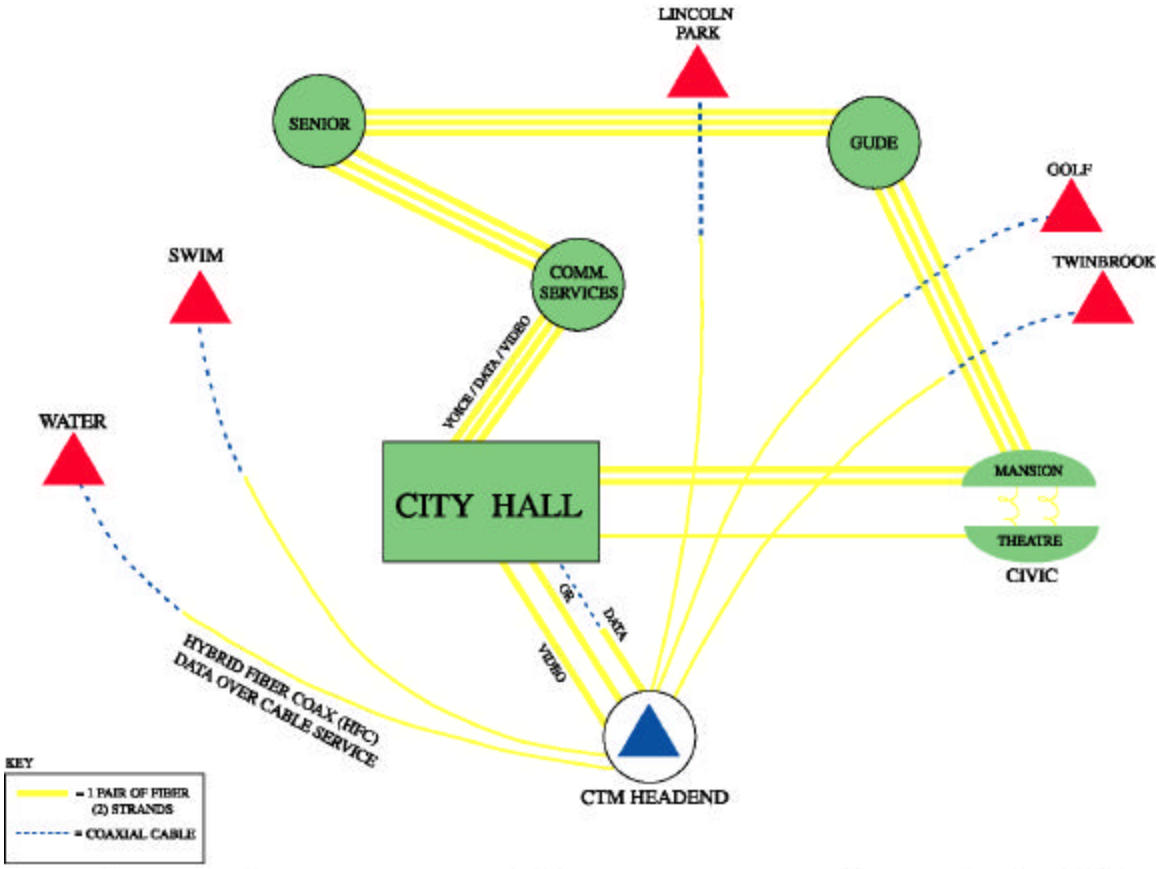
The cost savings for implementation of the combined fiber based I-Net and data over cable I-Net services equate to approximately $32,000.00 per year with the elimination of current leased voice and data circuits. This does not take into account costs that will be avoided by cost effective implementation of video services and expansion capacity for data and voice services. Taking these potential increases in costs into account if leased lines were used instead, significantly increases the savings that would be realized by the City. Overall, equating the cost of initial equipment purchases to implement I-Net services utilizing the recommended implementation described above and shown below

versus just the reductions in current leased line costs, the payback period would be less than two years, without factoring in cost avoidance which would reduce this payback period further.



POTENTIAL FUTURE ROCKVILLE NETWORK TOPOLOGY
STAR FOUNDATION

FIGURE 1
(not to scale)



POTENTIAL FUTURE ROCKVILLE NETWORK TOPOLOGY
RING FOUNDATION

FIGURE 2
(not to scale)

Projected Cost of Recommended I-Net Architecture Implementation

Fiber-based I-Net

Location	***Transmission Equipment Cost***	
	Low Range	***High Range***
4 Remote Sites Without Video	$14,000	$30,000
Analog Video Add-on For 2 Remote Sites	$5,000	$7,000
City Hall Site (Including Video)	$19,000	$25,000
TOTAL	$38,000	$62,000

Note: The above does not include an annual network maintenance charge, estimated at $700.00, or any demand maintenance charges that would be assessed.

Data-Over-Cable I-Net

Note: Current cable modem cost projection is $0. If equipment cost is ultimately assessed, the total for 6 sites (including City Hall) would range from $3,000.00 to $12,000.00.

Appendix 8

Rockville Departmental Telecommunications Needs Assessment

Introduction

The City of Rockville's municipal government departments were surveyed regarding telecommunications needs and interests specific to each area. Nine departments were issued a survey and representatives from all nine responded. The survey was designed to assess current technology in use and anticipated technology usage. The following narrative offers a summary of the findings.

The Responding Sample

The responding departments included the City Manager's Office, the City Clerk, the Legal Department, the Department of Public Safety and Community Service, the Department of Recreation and Parks, the Department of Finance, the Personnel Department, the Public Works Department and the Department of Community Planning and Development.

The number of employees working within the departments varied. Just over 44% had less than 25 employees, 22% had between 26 and 49 employees and 33% had more than 50 employees.

Most of the departments were located in City Hall. However, the Department of Public Safety and Community Services also had two other locations in the City, and Public Works and the Department of Recreation and Parks had multiple locations as well. In all, 16 satellite offices were indicated by respondents.

All of the department representatives responding to the survey were in leadership or key staff positions, identifying themselves as managers, directors or planners.

When asked what was the primary function of their department (some indicated more than one main function), most indicated to provide services to City residents (77.8). This was followed by: to provide services to City Departments (66.7); provide services to the business community (33.8); and lastly to provide service to community organizations (22.2).

Findings

All departments reported a variety of communications technologies currently in use. All departments reported using a FAX, telephone, voicemail, e-mail and the Internet. These unanimously-used technologies were closely followed by a majority reporting using workstation or PC networking, cellular telephones and wireless/radio systems. Also in use, but by less than the majority of departments, were the technologies of audio conferencing, cable television, security/telemetry, and document scanning/imaging.

Communications technologies currently not reported in use among City departments included: videoconferencing, automated response units, teletraining, telecommuting, and Satellite/Microwave Transmission/Reception.

Current use of technologies was principally reported in support of performing necessary daily communications functions. This was the most frequently cited use of the telephone, voicemail, FAX machine and E-mail. Beyond basic communication functions, the second most frequent cited service of technology was to provide for the exchange of data and/or documents. This was noted by respondents as a significant function of the FAX machine, workstation networking and E-mail. Closely following data exchange as a function of technology, was what respondents described as information sharing. This was noted as a use of several of the technologies, but most significantly with E-mail and Internet access. Another function that appeared for Internet access and workstation networking was research.

Respondents were asked to describe any problems that they had encountered while using the noted technologies. It is notable that the reported problems were redundant across technologies. Three problems encountered were consistently noted by respondents. These included: problems with reliability, access and speed. Several respondents articulated frustrations with technology "going down" or having technical problems. Requests were noted for more FAX machines, more memory on voicemail, a larger paging service area and enhanced communications speeds.

When asked how they provided service, most departments reported principally providing service in-person or over the telephone (54%). This was followed by written correspondence, computer connections and FAX machines. One respondent reported using video (cable television) for a large portion of their office's work.

A majority of departmental representatives felt that the current way in which they provide service to the public and other organizations needs enhancement. One respondent noted that their department needed a fiber run from the City cable television government access center to the cable headend so that video services could be enhanced. Another respondent noted a desire for City services to be made more readily available on-line.

Seventy five percent of respondents indicated a need for higher communications speeds, but only one was able to articulate how high (T-3 was noted by this respondent). When asked what applications need higher speeds, most often respondents indicated that it was needed for Geographical Information Systems access, faster/greater throughput, full motion video and the capacity for additional users.

Respondents were asked what locations would need higher speeds. Responding departments indicated their main City Hall location. Public Works further expressed a need to extend a high-speed network connection to each of its workstations. Additionally, the City Manager's Office responded by indicating the following specific departmental locations: City Manager, Cable TV Office, Web Administrator, and Graphics.

When thinking ahead over the next two years, respondents were able to articulate several desires related to each of the technologies currently being used.

The ability to FAX from their desktops and dedicated FAX lines for each department were indicated.

Regarding the City's telephone system, a desire for increased lines on each number; one-touch dialing for internal calls; caller ID; increased sound levels; a 24-hour City Hall/City Government telephone information system; an automated answering system with menus and submenus; and an updated switchboard were all indicated by respondents.

E-mail software with: spell-check capabilities; dial-in access from home; links with voicemail; better message management; automated signatures; internal city forms; electronic address books and faster speeds were requested by survey respondents. Message and document attachment and messaging related to leaves of absence were also requested.

Internet access with a faster server, video capabilities and connections to all satellite buildings were also requested.

Extended paging features were indicated as desirable by respondents as well as building-wide paging services. More modern cellular phone services were also noted as needed.

Expanded voicemail features were expressed as needed in the future by several departments. This included the ability to broadcast messages across the entire network. Another respondent indicated a desire to link voicemail with E-mail.

In the area of workstation networking, a desire to use data/document sharing with more efficiency was expressed. The ability of all employees to access City-used software related to systems such as GIS and permits, as well as other databases, was indicated as desirable. One respondent said they would like to be able to send a file to the copier for printing and copying simultaneously.

Video system connections to the Senior Center and the F. Scott Fitzgerald Theatre were noted as desirable.

Regarding public safety communications, Public Safety and Community Services indicated two major areas of needed enhancement. First, internal communications systems need significant updating, including such items as equipment to automatically provide additional identification information regarding incoming calls. Second, the City's public safety mobile radio communications system was noted as needing to be significantly technologically upgraded. More information is available in Appendix 6 on public safety communications needs.

In the "other" category, several respondents made comments about desired equipment upgrades. These included a desire for live video via the City's website, and additional staff, workspace and connections to manage and develop the website. Public Safety indicated a need for the new substation at Lincoln Park Community Center to be wired

with all necessary and available technology. Palm Pilots were noted as a needed addition by one department and others noted needed access to the Permit Plan and GIS systems.

Over 70% of the departments indicated that they needed enhanced or new "connections" to other agencies. Five departments indicated desired connections with clients and certain resources. The City Clerk indicated a desire to access County and State databases. Public Works would like to access the GIS and Signal system tied to the County. Parks and Recreation indicated a desire for interagency connection for better, more efficient scheduling. The Legal Department would like to connect to other government agencies, Court docket information, land records and other similar documents for more efficient means of research.

When asked what services the City needs to provide interactively on-line, a majority of departments indicated a need or interest related to almost all of the offered categories. These included: general information; forms; registrations; employment applications and surveys. Less support was indicated for permits on-line with 33% indicating a need to provide such a service.

The portion of the budget indicated by departments as being spent on communications technology and service needs, as well as the maintenance of such technology and services, had a wide range. Only one department spent over $500,000 annually on such services, while 33% indicated currently spending less than $50,000. Little change is anticipated for technology expenditures during FY2000.

When thinking about future planned technology expenditures, all were related to telephone and data communications network needs. These needs included upgrading telephone services and continuing the connection of satellite offices related to the local area networks and the wide area network.

Almost all respondents agreed that the most significant short-term need facing their departments was enhancing and taking full advantage of the technologies they currently employ. This included becoming more interactive with the public on-line, expanding and enhancing radio communications to improve public safety and gaining access to County and State databases for more efficient local decision-making. This also included the need for a better linkage of the various communications technologies currently being employed and anticipated.

Respondents were less able to articulate long-term needs and no one indicated having a long-term telecommunications plan. In general, a few respondents indicated a desire to "modernize" their office. Another respondent indicated a desire to increase interaction with residents electronically and lastly, one respondent indicated a FAX at each workstation.

In final comments, the Legal Department took the opportunity to express concern related to creating a secure and private electronic communications environment.

Conclusions

City departments in Rockville reported a significant level of current technology usage. All departments indicated using FAX technology, telephone, voicemail, E-mail and the Internet. A significant number are also involved in peer-to-peer workstation networking, audio conferencing and document scanning. For several areas that were noted as not being part of current communications technology usage, respondents indicated that bringing these into greater use was underway or planned.

Communications technology appears to be used for three primary reasons: basic communication functions, data/document sharing and sharing information. Problems encountered with current systems were related to the reliability of the system, access to the technology, the speed of the technology and lastly to the limitations of the hardware/software within the system.

Of most immediate concern to the responding departments appears to be enhancing the technology currently in use. Respondents indicated a desire for enhancements such as: more voicemail memory; networked voicemail; E-mail software that allows them to do more; dial-in access to the technology they use at work; and automated phone lines with menus that provide departmental information. A desire for wider paging and cellular service areas were also indicated.

Explicit enhancements to provide more video access and delivery were also indicated. These included a desire for more live origination video, video via the City website and the ability to provide two-way interactive video.

When considering future telecommunications needs beyond those previously mentioned, respondents had more difficulty expressing their needs and interests. While they did indicate that several of the technologies not in use would be useful such as, telecommuting, videoconferencing, teletraining and automated response units, most were not able to expand beyond that comment. Perhaps the respondents' ability to so efficiently describe enhancements to the current system are a testament to their ability to integrate technology into their daily work and then having done so, build upon that technology. Based on the findings of this telecommunications needs and interest survey, it is likely that further advancements in technology made by the City will be utilized efficiently and effectively once integrated into daily operations.

Additional detail was gathered during follow-up interviews. This information, as well as specific recommendations for enhancements or additions to the City’s voice, data and video systems, are found in other Policy/Plan Appendices.

Telecommunications Needs Assessment Survey Instrument Mark-up
(N=9)

1. Department:

   City Manager's Office

   City Clerk

   Legal Department

   Public Safety and Community Service

   Recreation and Parks

   Department of Finance

   Personnel Department

   Public Works

   Community Planning and Development

2. Number of employees:

   44.4 1-25

   22.2 26-49

   33.3 More than 50

3. Location:

   Most respondents listed City Hall. Public Safety indicated 111 Maryland Avenue, 32 Court House Square, 313 Frederick Avenue. Recreation and Parks indicated having multiple locations. Public Works indicated additional locations.

4. Person responding to survey:

   Julia Novak/Doug Breisch
   Donna Boxer
   Rich Hajewski
   Sara Ferrell
   Anita McCombs
   T. N. Treschuk
   Hall
   Hal Cranor
   Stacy Wood

5. List any satellite or field offices of your organization:

1. One Church Street, Fifth Floor, Rockville, MD
2. 225 N. Washington Street, Rockville, MD
3. 32 Courthouse Square
4. 313 Frederick Avenue
5. Swim Center
6. Civic Center
7. Parks Maint. @ Gude Dr.
8. Lincoln Park Community Center (LPCC)
9. Redgate Golf Course
10. Senior Center
11. Twinbrook Recreation Center
12. Nature Center
13. Stockroom & Meter shop at Gude Dr.
14. Safety & Risk Management at maintenance facility
15. Maintenance Yard - 14625 Rothgeb Dr., Rockville, MD
16. Water Plant - 10930 Sandy Landing Rd., Potomac, MD

6. What is your department's primary function:

66.7 Services to Other City Departments
77.8 Services to City Residents
33.8 Services to the Business Community
22.2 Services to Community Organizations
0.0 Other (Please Specify)

7. Please indicate the communications methods and systems your department currently uses. (Check all that apply.)

100	FAX	33.3	Security/Telemetry
100	Telephone	100	Voice Mail
100	E-mail	66.7	Workstation or PC Networking
100	Internet Access	22.2	Document Scanning/Imaging
22.2	Audio Conferencing	0.0	Teletraining
55.6	Paging	55.6	Wireless/Radio System
0.0	Videoconferencing	0.0	Telecommuting
88.9	Cellular Telephone Transmission/Reception	0.0	Satellite/Microwave
		33.3	Cable TV/Video Origination
0.0	Automated Response Unit		
11.1	Other: Modem		

8. For each application checked in Question 7, **briefly describe** below its major uses in helping to perform your organizational function.

Type	**Current Use**	**Percentage**
Fax	Communication Data/Document Transmittal Information/Data Sharing	44.4 22.2 33.3
Telephone	Communication Information/Data sharing Daily Business	77.8 11.1 11.1
E-mail	Communication Information Data Sharing Data/Document Transmittal	55.6 22.2 11.1 11.1
Internet Access	Communication Information Data Sharing Research	14.3 28.6 14.3 28.6
Audio Conferencing	Communication	22.2
Paging Service	Communication Access Call Backs	22.2 11.1 11.1
Videoconferencing	--	--
Cellular Telephone	Communication Access Daily Business	55.6 11.1 11.1
Automated Telephone Response	--	--
Security/Telemetry	Alarm System	11.1
Voicemail	Communication Information Daily Business	77.8 11.1 11.1
Workstation or PC Networking	Communication Information/Data Sharing Data/Document Transmittal Daily Business/Workload Research	11.1 11.1 11.1 11.1 33.3
Document Scanning/Imaging	Information/Data Sharing Graphics and Publications	11.1 11.1
Teletraining or Other Video Distribution	--	--
Wireless/Radio System	Communication Daily Business/Workload	44.4 11.1

Type	**Current Use**	**Percentage**
Telecommuting	--	--
Satellite/Microwave Transmission	--	--
Cable Television	Communication (w/public) Information Promotion	11.1 11.1 11.1

8b. Please describe any problems you've encountered with the functionality of these applications.

Type	**Problems Encountered**	**Percentage**
Fax	Reliability Not enough access. Too few machines	33.3 22.1
Telephone	Truncated lines are a problem with caller ID	22.1
E-mail	E-mail limitations (DOS based) Reliability Speed	22.2 33.3 22.2
Internet Access	Speed Reliability	33.3 33.3
Audio Conferencing	--	--
Paging Service	Paging Service Area	22.2
Videoconferencing	--	--
Cellular Telephone	Reliability Busy Signal Need to switch to "Nextel" like system	11.1 11.1 11.1
Automated Telephone Response	--	--
Security/Telemetry	--	--
Voicemail	Reliability Low level of saving messages	22.2 11.1
Workstation or PC Networking	Reliability Hardware Limitations	55.6 11.1
Document Scanning/Imaging	No Availability	11.1
Teletraining or Other Video Distribution	--	--
Wireless/Radio System	--	--
Telecommuting	--	--
Satellite/Microwave Transmission	Reliability	11.1

Type	Problems Encountered	Percentage
Cable Television	Modulator problems Cannot originate programming from other locations Playback machines need upgrade	11.1

9. What are your primary methods of providing services to the public or other organizations? (The mean is noted first, followed by the mode in parentheses.)

36.1 (25)	In-person contact	9.8 (4)	Other computer communication
35.3 (25)	Phone	7.3 (10)	Fax
50.5 (1)	Video	----	Imaging
15.3 (5)	Written correspondence or other hard copy		
----	Other **(specify)**: --		

10. Are the ways that these services are currently provided adequate?

42.9 YES 57.1 NO

Please describe: Need fiber optic from television station to cable headend (will be provided via cable franchise). Need to be able to originate video/audio from City buildings. Automated call distribution would be useful for phone. On-line permits and other forms would reduce in-person visits.

11. Do you need higher communications speeds (e.g. data transfer rates) for some or all of the applications you employ?

75.0 YES 25.0 NO

If yes, how high?

---	Up to T1		
16.7	Above T1	How High?	T-3
83.3	Don't know how high.		

12. What applications need higher speeds?

33.3 GIS
22.2 Full Motion Video
33.3 Faster/Greater Data Throughput
11.1 Capacity for Additional Users
----- Other

12b. What locations will need the above applications?

1. City Hall, Cable TV Office
2. Web Administrator
3. Graphics
4. City Manager's Office
5. At Each Workstation

13. Please check or describe any new applications or upgrades that you believe would improve your department's workflow and/or benefit public service in the near or longer term. (All responses are singular unless noted with subsequent percentages.)

Type	**New Applications/Upgrades Needed in Next 2 Years**
Fax	Ability to fax from individual computers. (66.7) Department FAX line.
Telephone	Live on-air call in for TV. Increased capacity on each phone for number of lines. One touch dialing internally. Expansion to handle new employees and applications. Caller retrieval. Updated switchboard. 24-hour City Hall/City Government information system. Automated Caller Distribution. Sound not loud enough. Answering system with access to 5 features: hours, directions, tournament operations, lesson information, pro shop. Rec: Handles over 400 calls a day when busy. Remote phone dies after an hour of use.
E-mail	Spell Check capability. Mac compatibility. Ability to set up external groups. Link with voicemail. Ability to attach files by full name. View document before attaching. Check messages from home. Better message management. Spell Check and thesaurus. Include telephone ext. on signature. Maintain permanent master address list. Extended leave messaging system. City Hall chat rooms. Connect golf course superintendent. Shared calendar for scheduling appointments among several clerical staff. Ability to attach several files. Automatic signatures.

Type	**New Applications/Upgrades Needed in Next 2 Years**
E-mail (cont.)	Automatic hyperlink. Warning messages regarding memory. Internal City Forms, such as printing and graphics requests. Faster speed.
Internet Access	Keep up with technology. Video via Internet. Connect golf course superintendent. Faster server.
Audio Conferencing	May be helpful to City Information Officer Improved quality.
Paging Service	Building wide paging service in City Hall. Upgrade range of pager.
Video-conferencing	--
Cellular Telephone	More modern phones.
Automated Telephone Response	----
Security/ Telemetry	----
Voicemail	Ability to call one number and send same message to several numbers. Link with E-mail.
Workstation or PC Networking	Ability to share more documents with other departments. Access to Permit Plan, citizen service request database, GIS. Transfer protocol between MAC and PC. (Graphics, files, budgeting) Ability to send files to photocopiers. Link to private sector. Faster PCs, More memory.
Document Scanning/ Imaging	Ability to put scanned material into word processing application.
Teletraining or Other Video Distribution	----
Wireless/ Radio System	----
Telecommuting	Would be useful.
Satellite/ Microwave Transmission	----
Cable Television	Connection to Senior Center, F. Scott Fitzgerald Theatre.

Type	New Applications/Upgrades Needed in Next 2 Years
Other	Equipment to put video on the web. TV Office to web administrator. Additional staff, workspace, connections and equipment for Web administration. Live video on web site. Ability to originate from City and non-City locations. Should be connected to Permit Plan. Need GIS now. Need new substation at Lincoln Park Community Center to be wired with all available technology. Palm Pilots.

14. Does your department need enhanced connections to other government agencies or other organizations via a data and/or video communications network?

    28.6 NO 71.4 YES

    Which organizations and why?

    City Clerk: We currently have connections to other government agencies. It would be beneficial to be able to connect to County and State agencies to access information, especially County Board of Elections.

    Public Works: It would be useful to have the GIS & Signal system tied into the County.

    City Manager's Office: Cable TV Montgomery, Starpower, other future multichannel video providers, enhanced graphics transfer between TV Office and Graphics, Planning, Police and Public Works. Videoconferencing with other municipalities and County.

    Recreation and Parks: With interagency coordination board for facility scheduling. GIS.

    Legal: We do not have currently have connections to other government agencies. It would be very beneficial to connect to various County and State agencies and offices to access information (i.e. court dockets, land records, etc...) This information is not available on the Internet, but some agencies allow us to connect to their internal computerized systems.

15. Which of the following types of services do you believe the City most needs to provide interactively on-line?

66.7 General Information and responses to questions about City Services
55.6 Forms
55.6 Registration (recreation classes, etc.)
55.6 Employment Applications
33.3 Permits (building, etc.)
44.4 Surveys
11.1 Other: Interactive databases, upgrade web administrator's software, ability to deal with forms that require signatures, on-demand City television programs, ability to search video files.
11.1 Don't Know

16. Please check the category that best describes your department's overall service, equipment, maintenance, operation and administrative costs for the current and next year related to the voice, data and video networks and systems that you utilize (**i.e. costs paid out of your department's budget**):

Year FY99:		Year FY2000:	
$0-$50,000	33.3	$0-$50,000	44.4
$50,000-$100,000	11.1	$50,000-$100,000	0.0
$100,000-$250,000	11.1	$100,000-$250,000	11.1
$250,000-$500,00	0.0	$250,000-$500,000	0.0
Over $500,000	11.1	Over $500,000	11.1

17. Please describe any new programs or expansion of existing programs planned (budgeted) which will require additional telecommunications resources and describe the telecommunications resources, which will be needed:

Purchase of a new phone system for information technology.
Swim Center; fiber or cable modem for centralized information processing.
Twinbrook Recreation Center: telephone and computer networking.
Lincoln Park Community Center: fiber or cable modem.
Nature Center, Elwood Smith Community Center, Gude Drive Gym, Golf Course and Pro Shop: Fiber or cable modem so that each can participate in local area network and wide area network.
Public Safety: We need an entirely new communications center.

18. What is the most important communications-based issue facing your department at this time?

Recreation: On-line registration, GIS applications, survey of citizens.
Legal: Learning to use what is available.
Public Safety: Lack of appropriate radio communications.

Community Planning and Development: Access to data external to City Hall in locations such as Montgomery County government, MNCPPC, WMCOG, MD state government.

19. What are the most critical **long-term** communication needs of your organization?

Public Safety: Modern communications center.
Public Works: Fax at each workstation.
Recreation: Interactivity with citizens.

20. Does your department have a written plan, concept or departmental policy to address future telecommunications needs and uses?

0.0 YES
75.0 NO
25.0 DON'T KNOW

21. Any other comments:

Legal: This office deals with many legally confidential documents and matters. There is a need to provide confidentiality for faxes, E-mail and other communications, especially those sent to and received from external sources.

Appendix 9

Overview of New Telecommunications Technologies and Services

Introduction

The pace of change related to telecommunications technologies and services is exceedingly fast for both wireline and wireless-based services. Some observers note that the technology information base, which just a short while ago doubled in size every decade, and before that every quarter century, now doubles in size in under two years. This means that there are continual changes and developments in infrastructure and services deployment. These changes will both enhance and impact the City of Rockville's (City's) use of, and reaction to, the implementation of telecommunications infrastructure and services at the local level.

Five telecommunications technology and service areas are profiled below which are having or will have a significant impact on the development and provision of services to citizens, businesses, government and other organizations and institutions in Rockville.

Fiber Optics Transmission Technology

New developments in signal transmission using fiber optics, essentially the carriage of light waves over glass fibers, continue to occur. A single strand of fiber optics, slightly more than the thickness of a human hair, can now carry gigabits of data. In fact, laboratory trials last year produced transmissions of 1 terabit (1 trillion bits) over a single strand for short distances.

In the last few years, Wavelength Division Multiplexing (WDM) technology has seen greater commercial application and the cost of such technology is decreasing. Essentially, traditional fiber transmission systems required two strands of fiber for full duplex (simultaneous two-way interactive) communications to be implemented. With WDM, full duplex communications can now occur on the same fiber, because the upstream and downstream communications are sent in each direction using different, non-interfering wavelengths of light. Recently, Dense Wavelength Division Multiplexing (DWDM) has come into its own. DWDM technology enables multiple numbers of wavelengths (essentially different colors of light) to use the same fiber so that a number of simultaneous upstream and downstream communications can occur.

These advances in transmission technology are especially important when combined with the fact that the cost of the fiber itself continues to decrease and that the installation technology continues to improve such that fiber cabling is more durable, splicing is more efficient and long lasting and the whole installation process is less costly. This means, as noted below, that use of fiber optic transmission technology will have more and more applications in the future.

Fiber optics are extremely useful as a telecommunications transmission medium because the medium itself is inherently reliable. For example, fiber affects data transmissions at only an 1 x 10 to the minus 13 Bit Error Rate (BER). This is a far better BER than the transmission equipment that is attached to the fiber. Also, fiber optics are not subject to Electromagnetic Interference (EMI) that comes from sources such as impulse noise from

nearby engines, motors, transformers, etc. and the lightning that occurs during electrical storms. Further, fiber optics enables telecommunications transmissions over great distances without repeaters, which means less points of failure and less equipment-related noise and distortion in the signal. These combined factors enable high signal-to-noise ratios to be maintained over fiber. The net affect is that video transmitted over great distances, for example, remains high quality and visibly free of noise. Voice and data transmissions are also unaffected over great distances.

The underlying reliability and quality attributes of fiber as well as recent developments in transmission technology and decreasing cost of deployment, make fiber optics the cabling of choice for today's wireline networks. For example, cable television systems which used to be all coaxial cable based, now are increasingly using fiber optics exclusively for metropolitan area backbones and are employing fiber optics in Hybrid Fiber Coax (HFC) architectures for upgraded and rebuilt systems. In an HFC architecture, fiber is deployed from the headend to neighborhood nodes of approximately 500 homes and then coaxial cable continues to be used from that point to provide cable television signals to the home. Such an architecture enhances the capacity, reliability and signal quality of modern cable television systems.

It is likely that, over time, fiber use for telecommunications and cable services will continue to be stretched towards the home such that the employment of Fiber-To-The-Home (FTTH) architectures will see greater use in the future. Additionally, advances described above are making fiber optics more attractive for wireline networks within buildings. In fact, some companies are now starting to build fiber right to desktop within their facilities. These are important points for the City in that it should continue to see more fiber optics cabling placed in both the residential and business sectors of Rockville. Further, just like it is considering the use of Institutional Network-based fiber WAN connections between its own facilities, the City may see a migration of fiber throughout the inside of its facilities over time.

Data Over Cable Modems

The provision of data communications services over cable television networks has been around for close to two decades and the technology continues to improve. Essentially, digital signals are modulated onto an RF carrier, using sophisticated modulation techniques such as Quadrature Amplitude Modulation (QAM), and then placed onto the cable system where they are demodulated at the receive end. The transmission equipment for this process are commonly called cable modems and they attach directly to the coaxial cable coming into the home, business or institution that also provides other cable services. These modems can either be outboard devices or they can be on cards that plug directly into PCs.

Data over cable services typically require 6 Megahertz (MHz) of bandwidth (the same as a standard television channel) in both the upstream and downstream directions to provide services to a number of users that may share a particular channel. The number of users that can utilize the same channel depends on the ultimate speed or transfer rate of the

system and the type of use. For example, data over cable channels used for the occasional type of access experienced for some residential uses can accommodate a large number of users simultaneously. Data over cable channels used for LAN-to-LAN interconnects may be limited to use by a smaller number of facilities that have continuous traffic requirements.

Each 6 MHz bandwidth enables symmetrical (the same transfer rate in both directions) operation of up to 10 Megabits per second (Mbps). This is the same as an Ethernet which is why these systems are sometimes called "broadband Ethernets." Asymmetrical operation (more speed in the downstream direction than in the upstream direction) of up to 35 or 40 Megabits per second (Mbps) can be achieved using different modem configurations.

Until recently, cable modem technologies have been developed in proprietary formats, meaning they were not interoperable with other vendors' equipment. Now, new modems are being developed according to a recent industry standard known as DOCSIS (Data Over Cable Service Interoperability Specification). The new DOCSIS-compliant modems are interoperable and have significant features including:

- Data Encryption Standard (DES) security components
- modular upgradability, including upgrades to interact with and provide digital video such as video on demand
- variable symmetrical and asymmetrical configurations, based on the needed application
- Quality Of Service (QOS) bandwidth designation capabilities to enable certain uses and users to have a guaranteed transfer rate

The ability to operate in both a symmetrical and asymmetrical fashion is very important to the utility of data over cable technology for meeting the needs of various sectors. For example, symmetrical operation enables high speed LAN to LAN and WAN interconnections which need equally fast upload and download speeds. This will be useful to businesses, organizations and home telecommuters. On the other hand, asymmetrical operation provides the high downstream transfer rate that is needed for heavy download operations, such as Internet access. This makes data over cable technology extremely useful in the home market.

CTM is anticipated to more fully deploy data over cable technology as its system is upgraded to a two-way interactive HFC system. It reportedly will employ two-way cable modems manufactured by COM 21, one of the larger cable modem suppliers to the cable industry. CTM is currently rolling out cable modem services using cable downstream/telephone upstream modems, because the cable system's upstream path is not fully active.

The importance of the rollout of data over cable technology to the City is two fold. First, data over cable technology will help meet some of the residential and business needs assessed by bringing high speed data communications capabilities into the home and to

small businesses. Second, the City will find it useful as part of its overall I-Net WAN utilization.

Digital Subscriber Line

Digital Subscriber Line (DSL) technology has also been around for a number of years, but has only recently come into its own as the capabilities of DSL have increased while the cost of employing DSL has decreased. Essentially, DSL uses technology that enables a high volume of data to be transmitted down a standard telephone wire connection. Consequently, DSL has effective transfer rates of up to 1.5 Mbps in a symmetrical fashion and up to 10 or more Mbps downstream in an asymmetrical fashion. This enables uses similar to that described above for data over cable technology, in that symmetrical operation provides services for Small Office and Home Office (SOHO) applications and asymmetrical operation provides significant residential applications such as high speed Internet access. There are a variety of types of DSL (for example, Asymmetrical DSL is commonly known as ADSL) such that the prefix "x" is sometimes used (i.e., xDSL) to generically note Digital Subscriber Line technology.

DSL has the capability to integrate video, voice and data services such that the same DSL line, for example, could provide Internet access, telephone and cable-like video services. Sharing a single DSL connection for such services though, could place limitations on integrated service delivery. For example, while voice communications would be largely unaffected, Internet access could be something less than high speed if a full motion video service was received at the same time. In fact, the video service in an integrated delivery scheme may have no more than VCR-type picture quality.

Accordingly, many current DSL providers are focusing on non-integrated service delivery at this time, until the technology continues to improve such that integrated services are enhanced. For example, many are focusing on the high speed data communications delivery aspect of DSL, and leaving voice services on existing lines.

For traditional phone companies, DSL has been slow to roll out. Some analysts note that part of this may be due to economic rather than technological concerns, since DSL could take away from existing high revenue streams for ISDN services (commonly used at 128 Kbps) and T-1 services (1.54 Mbps). Additionally, because DSL provides services over existing telephone line infrastructure, the sales of second lines, which have increased dramatically due to home computer use, could also be affected in a negative manner.

DSL is provisioned at the customer location using a network interface device. The local wire center (central office) must also have equipment in place to provision DSL. Rockville's wire centers reportedly are DSL ready and competitors to Bell Atlantic are currently offering DSL services to business customers. DSL technology is distance limited in that higher transmission speeds cannot be obtained at great distances from the wire center.

DSL is important to the City for several reasons. First, it is likely to be an increasing way, in competition with data over cable services, to bring high speed Internet access to residences and small businesses. Additionally, as the technology improves, it could provide significant competition in the home and office video services market. Further, it could be an option down the road to provide high speed data links to the non-fibered remote City facilities.

Internet Protocol Audio and Video

Internet use continues to grow exponentially for both home and business applications, including research, communication and electronic (e) commerce. At this point, the Internet is primarily used for data communications, but there is growing provision of traditional telephone (audio) and video communications over the Internet. Essentially, once voice and video are digitized, they can be sent over the Internet, just the same as other digital signals, using the Internet Protocol (IP) which at its heart enables a variety of different networks and systems to be interconnected.

IP voice or VoIP (Voice over IP) is enabled by an IP terminal device, such as a Multimedia Terminal Adaptor (MTA), that can interface with a standard voice handset or headset and then presents IP voice packets to the network. The biggest problem with today's IP voice technology is significant latency, which can create broken or missing voice transmissions. Essentially, with standard digital data, packet loss can still result in completed transmissions (using error correction and packet resend techniques), but significant packet loss causes problems in throughput or response time. However, packetized voice transmissions cannot be corrected as easily, resulting in clipping or missing words.

The technology for IP voice continues to improve such that superior voice quality at a lower than current cost should be available in the next few years. At that point, the use of the Internet for especially cost effective long distance and international calls could significantly expand, which would create an even greater need for high capacity backbone and service loop infrastructure for Internet use.

Video over the Internet, which is also currently in use, and is facilitated by digitization and packetization of video information (so that it can be compressed and sent in pieces between other types of Internet traffic and then put back together and decompressed at the receiving end) can be used for a variety of purposes including:

- Video streaming – Where raw video is sent in a continuous form from location to location for later processing, online editing, etc.
- Desktop videoconferencing – Many analysts believe that the greatest utility for video conferencing in the workplace will be "virtual" meetings accomplished at everyone's individual desktop, rather than the use of traditional videoconferencing centers and more like telephone conferences are done today except that the use of graphics and other visual meeting elements can be employed. To achieve full motion videoconferencing, a significant amount of bandwidth is needed.

- Videophone – IP voice and video services can be combined to provide videophone services. As the technology improves and the cost continues to come down, this may become a potent service option in both the business and home market.

Overall, the success of both IP voice and IP video depends on a continuing increase in capacity and speed available to both the home and office, which again reinforces the critical nature of making high speed Internet access services more and more accessible to both the residential and business sector in every jurisdiction, including Rockville.

Wireless Services

The use of wireless services for both residential and business applications also is expanding rapidly. This is true especially for voice services, as well as video and data services.

Wireless voice communications started as mobile radio, and the underpinnings of the technology have been around for decades. In fact, two of the foundational elements for today's Personal Communications Services (PCS), spread-spectrum and frequency hopping, were developed in earnest during World War II. Essentially, spread-spectrum technology enables efficiency of transmission by allowing each user's transmission to be spread across an entire frequency spectrum. These transmissions are coded so that the sender and receiver know the code. All other transmissions within that same bandwidth, which would normally cause interference, are not allowed to interfere because they do not have the proper code. Consequently, all but the applicable receiving station block out such extraneous transmissions. Frequency hopping also is efficient because it enables transmissions to constantly move to available frequencies, which may be just slices of bandwidth wedged in between other types of wireless services. Again, the transmissions are coded so that the sender and receiver know what frequencies are being used at what particular time interval.

Another underpinning of today's wireless voice telecommunications systems is the use of cells (larger cells for higher powered traditional cellular telephone systems, and smaller cells for lower powered PCS systems) to send and receive transmissions within a localized area. Each cell overlaps with adjacent cells so that as a mobile cellular or microcellular (PCS) user travels along a roadway, the call can be handed off from one cell to the next. Each cell is composed of a set of signal antennas, transmitters and receivers. Typically, the antennas are mounted on a tower, rooftop or other tall structure. The higher the power and the larger the cell, the higher the antennas typically must be mounted. The topography also helps dictate necessary tower height. The transmitters and receivers are part of the Base Transceiver Station (BTS) for each cell. Each cell communicates with the mobile user within that cell and then back to a Mobile Telephone Switching Office (MTSO). The MTSO will then communicate with other cells or other telephone systems, depending upon the destination of the call.

Traditional analog cellular telephone systems use Frequency Division Multiple Access (FDMA) to enable a number of users to access the cell's transceivers simultaneously.

With FDMA, each user is assigned a different frequency to use until their call is terminated. These frequencies can be reused in non-adjacent cells (sometimes cross-talk occurs when two users share the same frequency near cell boundaries or when the system has not been properly designed).

PCS and digital cellular use primarily two types of transmission techniques:

TDMA (Time Division Multiple Access) and CDMA (Code Division Multiple Access). With TDMA, multiple users share the same channel (slice of bandwidth) for a fixed length of time. TDMA takes advantages of minute pauses between words and sentences to efficiently enable many users to share the same channel. CDMA is a spread spectrum technology that enables everyone to use the entire spectrum of a specific cell, but each separate conversation is encoded with a distinct signature which is then decoded by the cell's BTS before it is transferred out of the network. The BTS understands the distinct signature of each separate conversation so that interference does not occur and therefore every bit of spectrum can be utilized efficiently.

There are two blocks (A and B) of traditional cellular telephone spectrum available in each marketplace. It utilizes frequency pairs between 824 MHz and 894 MHz. While there is still some growth for traditional cellular services based on an increasing number of wireless customers, the most dramatic growth is projected for the use of PCS services.

PCS services typically rely on more cells and lower power, but enable clearer communications, the use of integrated voice and data services and very affordable communications. Broadband PCS has 120 MHz of spectrum space assigned in 6 frequency blocks (A, B, C, D, E, F) between 1.85 GHz and 1.99 GHz as well as additional spectrum above 2 GHz.

There are a variety of systems being developed for wireless data transmission from both lower speed Cellular Digital Packet Data (CDPD) systems, to higher speed microwave and 800 MHz public safety communications systems subcarrier links, to global satellite-based PCS systems such as Iridium and Teledesic. As with other systems, the technology continues to be improved and rolled out with these systems so that a greater amount of wireless data capability and capacity is forecast for the future. Regarding wireless video systems, Direct Broadcast Satellite (DBS) services have grown significantly to over 8 million home consumers nationwide. With the advent of marketing arrangements with the Regional Bell Operating Companies (RBOCs), the forecast is for even greater rollout. Since such services already use a significant amount of digital compression and already provide some elements of Near Video On Demand (NVOD), it is likely that there will be increasing home use as well as future increases in business use with these and other wireless video services.

The importance of the above facts related to wireless communications is that forecast increases in the use of such technologies will require a corresponding increase in the amount of infrastructure to support the use of such technologies. This will require

appropriate reaction and response from the City in light of the value that citizens place on such services, while they are also significantly concerned about visible infrastructure.

Appendix 10

Residential Telecommunications Needs Assessment Report

The City of Rockville, Maryland's ("City") Office of Cable Television and Telecommunications conducted a mail survey of Rockville residents during October, 1998 to assess needs and interests related to telecommunications within the community. The City is taking a pro-active role in planning for the future telecommunications needs of its residents and community. This mail survey was conducted among residents at large and is a vital part of the information gathering process. In all, 23,610 surveys were mailed as part of the City's published newsletter, *Rockville Reports*. Of those addresses, 17,050 were to households in the City. In total, 1,451 completed residential surveys were returned by the indicated deadline for a response rate of 8.51%. A return of 1,451 completed instruments offers a margin of error of ± 2.9 points, the lowest accepted margin of error among survey statisticians. The 1,451 returned instruments were coded and the data was analyzed by Constance Ledoux Book, Ph.D., a professor and researcher in the area of telecommunications. She is part of a team headed by River Oaks Communications Corporation, a telecommunications consulting firm, which has been contracted by the City to assist with this important information gathering process and develop a proposed telecommunications plan and policy for the City.

The instrument, which consisted of four pages of questions, was designed with the following specific objectives:

- To assess current attitudes toward the quality and service related to local telephone service. These included areas related to installation, billing practices and quality of signal.

- To assess current attitudes among residents toward the cost of local telephone service.

- To assess current interests and needs related to wireless services, such as cellular telephones, paging and the future needs related to these technologies.

- To assess personal computer ownership and reported activity, needs and interests related to Internet usage.

- To assess attitudes toward current Internet Service Providers and the service provided by those companies.

- To assess needs and interests related to enhanced Internet use, including increased possibilities related to information and interactivity provided to residents by the City on its website.

- To assess the current level of, and possibilities of increased needs for telecommuting.

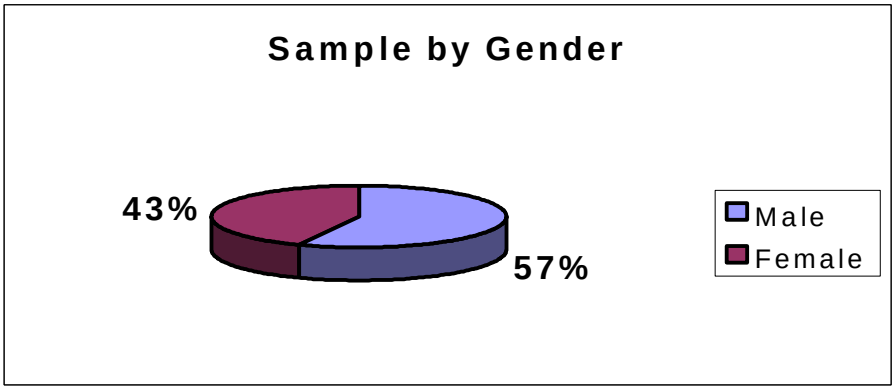
- To assess concerns among residents of Rockville related to the development of the telecommunications infrastructure in their community. These included property and visual disruption, as well as other environmental issues.

The instrument also included a series of demographic questions to better understand how the demonstrated telecommunications needs related to the population of Rockville at large.

The Responding Sample

Before launching into a discussion of the findings, it is important for the reader to assess the validity of the responding sample. The average household size responding to the survey was 2.4 (Mean) and the most common household size was 2.0 (Mode). By zip code, a majority of the respondents lived in the 20850 zip code (51.2%), followed by the 20851 (20.3%), 20852 (15.0%) and 20854 (13.6%).

Just over 87% of respondents reported "owning" their own home and 13% described themselves as "renters". The average length of residency in Rockville was 19.8 years, while the mode was one year. The average age of the respondent was 56.2 years and the mode was 40 years. The sample was nicely distributed between men and women, with 56.7% of respondents indicating that they were "male" and 43.3% indicating that they were "female".



Most respondents had completed college with 16 years of education reported on average.

By race, most respondents described themselves as white (91%). African-Americans constituted 2.6% of the sample, Hispanics 1.9% and the remaining 5% were from other minority racial groups, such as Asians and Native Americans.

In all, 488 respondents answered the question regarding annual income. The average annual income was reported as $72,159 and the mode was $100,000.[1]

[1] Based on the "Community Profile" published by the City, the demographics of the responding sample are reflective by age, income, education level and other characteristics. By racial composition, the sample differed somewhat (10 points) from the data shown in the Profile. This may be in part due to the lower response rate collected on the question, “What is your race?”, which about a third of total respondents (29%) chose not to answer. Generally, demographics about certain private information such as race, tend to have lower response rates and this was the case in Rockville. All racial groups were present among respondents and most attitudes reported were found not to be significantly different from those reported by the majority. Only one demographic characteristic varied greater than 10 points—whether the respondent was a homeowner or renter. This variance is very likely to be reflective of the community investment that comes along with permanent residence. Other, less significant variance is more than likely due to two factors. The first is that current demographic information relies extensively on census data from the last Census (1990). In late 1998, that data is likely to have changed somewhat. The second factor is that this survey was focused on a "Telecommunications Needs Assessment". A mail survey relies on the self-selection of respondents, in other words residents who chose not to respond may have determined that they did not have *telecommunications needs*. Where there are variances between census data and the demographics of the respondent in this study, there is evidence of this self-selection process. For example, researchers have consistently noted that adopters of new telecommunications technologies tend to be white, male and more educated. See, Pavlik, J. (1998). *New Media Technology*. Allyn and Bacon: New York, p. 228.

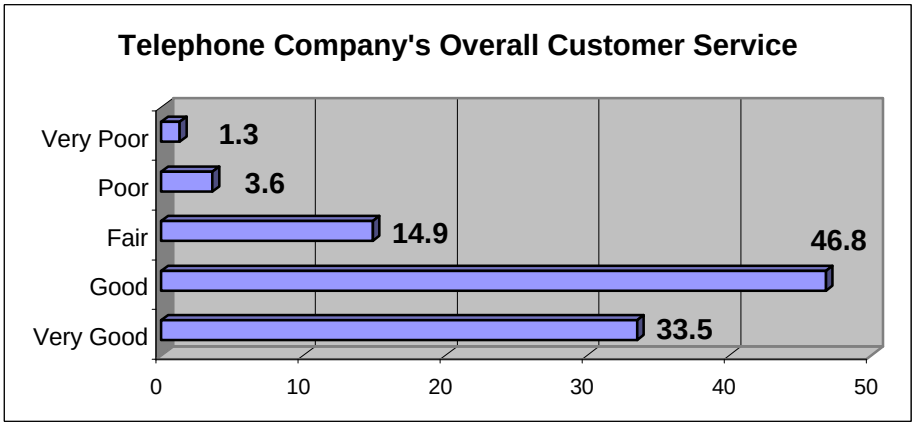
Telephone Service

Respondents were asked to rate six characteristics of telephone service on a scale of 1 to 5, with 5 being excellent and 1 being unacceptable. In order to interpret the values of the numbers that fall between 1 and 5, scores between 5 and 3.5 were considered positive; scores between 3.5 and 2.5, fair; and scores below 2.5, poor. The following table demonstrates the service category and the overall score. The categories are listed in order of "excellence" as indicated by respondents.

Service Category	Score
1. System Reliability	4.3
2. Sound Quality	4.1
3. Repair Service	3.7
4. Billing Practices	3.7
5. Installation	3.7
6. Prices	2.9

The highest ranking service features of the telephone company included its reliability and its sound quality. Falling lower, but still within the good/fair range was the telephone company's repair, billing and installation. Falling in the fair/poor range was the telephone company's prices with an average score of 2.9.

Respondents also were asked to rank the telephone company's overall customer service, excluding price, on a 5-point scale ranging from "very good" to "very poor." Over 80% of respondents found the telephone company's overall service "good" or "very good." Around 15% described the service as "fair" and less than 5% ranked it as "poor" or "very poor".



When considering how responsive the telephone company had been, 31% of the sample excused themselves from indicating a response because they had "never had a service problem" and 7% said they "didn't know". Of the remaining respondents, 18.6% described the telephone company as "very responsive", 29.1% as "responsive", 13.1% as "somewhat responsive" and 1.3% as "not at all responsive". These findings appear consistent with the overall customer ratings received by the telephone company.[2]

[2] The Federal Communications Commission's Common Carrier Bureau produces a *Common Carrier Scorecard* each year. In 1997, the most recent scorecard, issues related to service and rates constituted about 12% of the calls and letters they received. This was the smallest category of complaints and appears to reinforce the findings in Rockville, Maryland. FCC (1997). *Common Carrier Scorecard Report.*

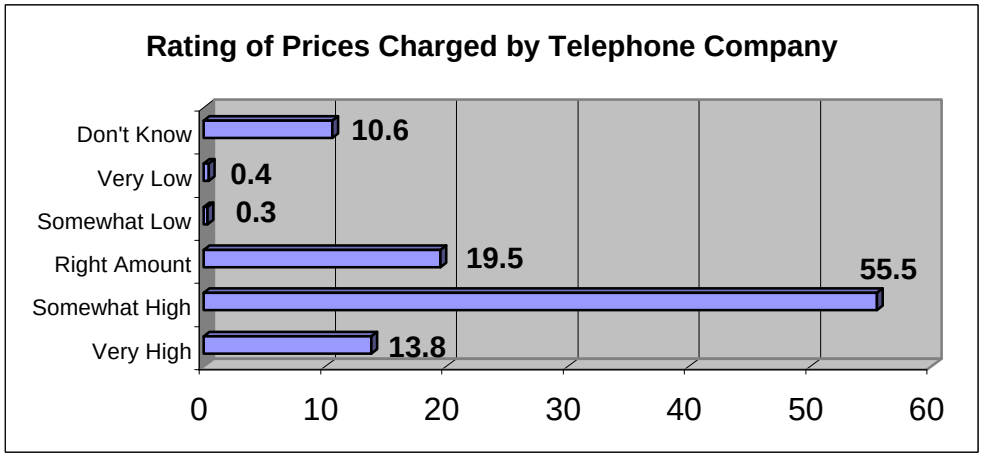
Over half of the respondents had called for telephone service at one time or another (57.3% of total respondents). Over 25% of respondents reported that the service problem was resolved the first day. Just over 20% reported that it took two days to resolve the problem and 11.5% reported that it took 3 days or more.

Just over a third of the respondents indicated that they had a second phone line to the home (38.1%). Of the remaining 60+% without an additional phone line, 30% are considering installing one. If this occurs, over half (55%) of Rockville residents would have a second phone line.

When asked why they had or were considering a second phone line (N=309 responses/21.3% of respondents), almost half, 47.6%, indicated the second phone line was for their computer needs. Similarly, 35% indicated that it was to access the Internet from home and 7% indicated it was to operate a FAX machine from home.

The reported average residential phone bill in Rockville runs about $52 a month. The most frequent response was $30 a month and the range of reported scores was between a reported $1 per month and $500 per month.

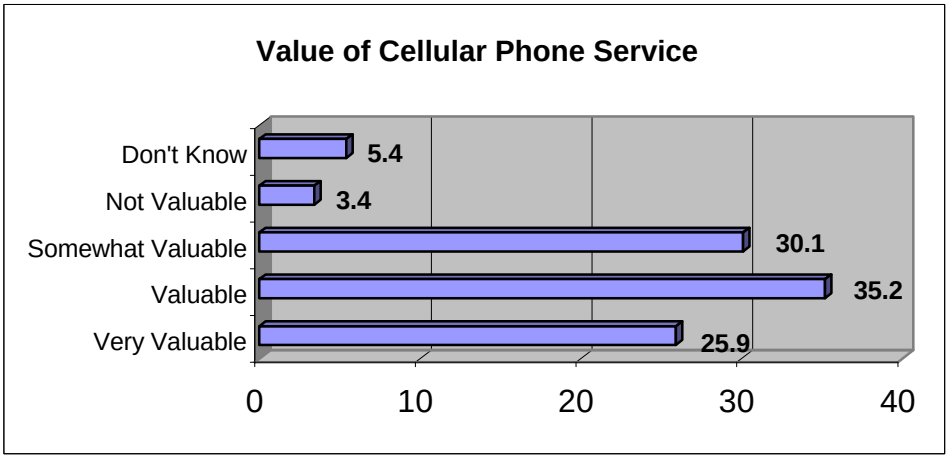
Respondents were asked to rate the prices charged by the local telephone company on a 5-point scale ranging from "very high" to "very low." Just over 10% of respondents excused themselves from the question by indicating that they "didn't know". Over 13% found the prices charged "very high", 55.5% described the rates as "somewhat high", 19.5% indicated the rates were the "right amount", 0.3% indicated the rates were "somewhat low" and 0.4% indicated the rates were "very low".



An advanced statistical procedure indicated that the relationship between reported overall satisfaction with telephone service was significantly related to reported attitudes toward the cost of telephone service. This relationship was significant with a 99% confidence, the highest attainable level of confidence between two tested items.

When asked if they would be likely to change to a competitor to the local telephone company if it should arrive, almost 40% of respondents indicated that they would. Sixty percent indicated that they would not.

Cellular telephones were in use by over 50% of respondents[3]. When asked how valuable cellular phone service was to them, 26% indicated it was "very valuable", 35.2% "valuable", 30% indicated "somewhat valuable" and 3.4% indicated that it was "not valuable". Just over 5% excused themselves from answering the question by indicating "don't know".



Of the 49% of respondents who currently do not have cellular telephone service, 21.7% indicated that they would adopt that service in the near future. This number represents 10.1% of the total respondents.

Interestingly, just over 17% of respondents indicated they use paging services.[4] Of those who use paging services, 36% described it as "very valuable", 29% as "valuable", 12.7% as "somewhat valuable" and 8.1% as "not valuable". Fourteen percent of respondents excused themselves from the response by indicating "don't know".

The 83% who presently do not have paging services were asked how likely they would be to adopt this technology in the near future and 95.5% indicated that they were not anticipating subscribing to pager services.

When asked if they had any other comments related to telephone service, 289 respondents took the time to make comments in the space provided. Most of these comments (29.8%) were related to dissatisfaction with the taxes and surcharges that appeared on their telephone bills each month. Several of these comments related to second phone line issues, with respondents expressing dissatisfaction with paying 911 charges on both lines and taxes on both lines. Several other comments related to a desire for reduced "package deals" where

[3] Cellular phone service, and now digital mobile phone service as well, are nearing the 30% penetration mark nationwide. By the year 2002, these phone companies are projecting that 50% of Americans will subscribe to mobile phone service. In Rockville that 50% of residents already exists. The top 3 reasons researchers have found people engage mobile phone services are: communications to anyone, anywhere at anytime; emergency communication; and landline back-up. See, Pavlik, J. (1998). *New Media Technology*. Allyn and Bacon: New York, p. 103.

[4] The Consumer Electronic Manufacturers Association reported in 1997 that 28% percent of households nationwide reported having paging services. However, among seniors only 8% reported using pagers. Perhaps because the mean age of the respondent in Rockville, Maryland was 56.2 years of age, the reported use level is lower. CEMA (January, 1997). *National CEMA Survey Gives Contrasting Views of Older Americans.* Additionally, because cellular phone ownership is higher in Rockville, the possibility exists that this might drive down the need for paging services.

they could receive local phone service, a reduced rate for the second phone line and a further reduced rate for cellular service. Thirteen percent took the time to make a positive comment regarding their satisfaction with telephone service and finally, 10% of respondents complained about the telephone company's practice of making their phone directories available to telemarketers. A summary of open-ended comments can be found in Appendix B of this report.

Internet Access and other Data Communications Services

Computer technology has diffused in the Rockville, Maryland area higher than it has in general across the rest of the United States.[5] Over 76% of Rockville respondents indicated that they had a personal computer. Of those, 83.5% indicated that the computer had a modem and 62.8% indicated subscribing to an Internet service. Most respondents are connecting to the Internet at speeds of 56K (42.6%), followed by 26% at 28.8K and lastly 3.1% indicated connecting at 33K.

The top 3 Internet Service Providers reported by Rockville respondents were America On-Line, accounting for 32.8% of those on-line, Erols with 29.9% of the market and AT&T with 3.1%. In all, respondents indicated 73 different Internet Service Providers.

Respondents (N=775 or 53.4%) indicated spending on average 1.48 hours on-line per day from their home. The most frequent response reinforced the reported mean, with 1.5 hours per day most frequently indicated.

Outside of the home, work was the primary place that respondents accessed the Internet (52.2%). This response was followed by "school" with 18.7% of respondents indicating it as their primary on-line access. The library accounted for 2.1% of respondents and 1.7% indicated "other". Other was described as home (even though this was a listed category), church, senior center, relative's house, Lake Forest, museum and computer store.

The *primary* Internet access location reported by respondents was home (56.4%), followed by work (38.1%), then school (2.4%), the library (2.1%) and "other" (1.1%).

Characteristics of service provided by the Internet company being utilized by the respondent were assessed. Respondents were asked to indicate on a scale of 1 to 5, with 5 being excellent and 1 being unacceptable, ISP service characteristics. These scores were generally favorable and are itemized in the following table beginning with the highest rating:

Service Feature	**Score**
1. System Access	4.47
2. Billing Practices	4.07
3. Ease of Use	4.05
4. CSR Courteousness	3.93
5. Ease of Contact with ISP	3.82
6. System Reliability	3.81
7. Price	3.66
8. CSR Knowledge	3.64

[5] National PC ownership is just around 40%. Ibid.

All of the ratings are in what one could describe as "very good" to "good". Interesting in these findings is how they differ from the ratings assigned to the local telephone company. Compared to attitudes toward the local telephone company, respondents report being more pleased with the cost of Internet Service. The lowest ranked category of service tested was respondent's ranking of the customer service representative's (CSR) knowledge. The CSR is more critical in regard to Internet service because he or she provides computer assistance.

When considering how valuable access to the Internet was at higher speeds, most respondents reported that it was valuable (60.8%).

Over 26% of respondents indicated that they were currently telecommuters and 49% reported that if more telecommuting capabilities were available this would be a benefit to them. When describing that benefit, most indicated it would allow them to work from home (29.1%) or give them the ability to telecommute (22%) and 12.5% indicated that they were desirous of accessing the Internet at faster speeds for application processing. While all of the mentioned categories were related to the ability to "work from home", perhaps the difference among respondents when describing the benefits of enhanced telecommuting are rooted in applications. For example, other respondents mentioned services, such as education and training, convenience, research abilities from home, efficiency and quality of life.

Respondents were asked to indicate which type of services they would most be interested in the City offering interactively on-line. Five specific categories were tested and are listed in the following table in the order of preference.

Interest in City Services On-Line	**% Interested**
1. General information and responses to questions about City services.	54.1
2. Registration	45.9
3. Surveys	39.1
4. Permits	29.0
5. Employment Applications	18.3
6. Other	N=149 or 10.3% 1. Community Events Calendar (10.7) 2. Cultural Events (10.1) 3. E-mail with Mayor, city council, city employees (9.4)
7. Don't Know	12.7

Most often respondents were interested in accessing general information and the ability to use the Internet to communicate with the City. These concepts also appeared in the services indicated by respondents in the "other" category, such as recycling information, pool hours, bus schedules, school closings and tax information on-line.

Secondly, respondents wanted the ability to "register" on-line for recreation classes and use of City owned facilities. This concept of replacing traditional telephone and mail services with electronic mail appeared in several of the comments made in the "other" category.

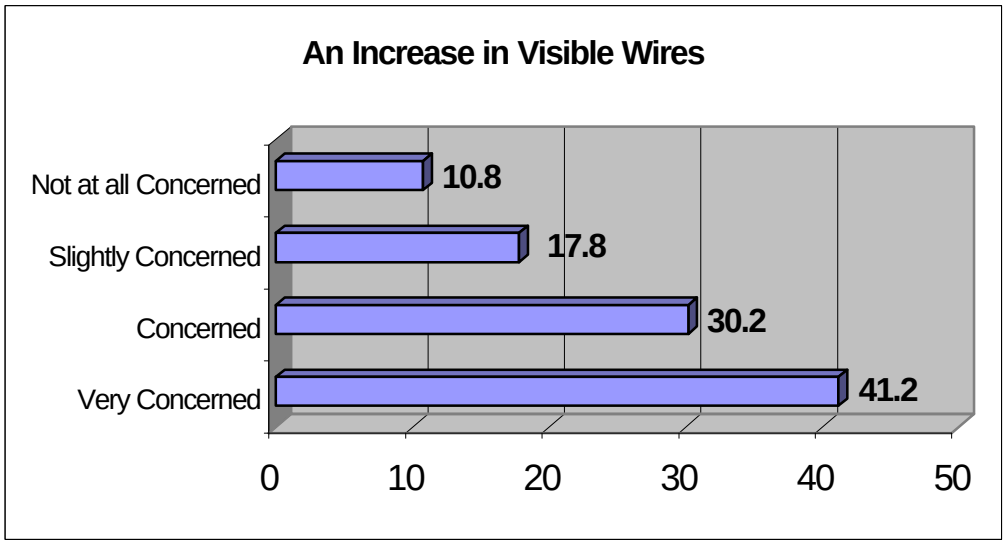
Respondents indicated they would like to request services such as snow removal, garbage pick-up and leaf removal. Thirdly, respondents indicated an interest in accessing survey information and completing surveys on-line on various community topics. Lastly, this category was followed by the ability to complete permit and employment applications on-line. In the "other" category, respondents indicated an interest in knowing what was happening in the community via an on-line community calendar, a schedule of cultural events and the ability to electronically communicate with city officials and city employees. A summary of mentions in the "other" category are offered in Appendix B.

Respondents were given a final opportunity to make comments regarding the Internet and other data communications, and 116 did so. Of those, most made comments regarding the need to have increased speeds in order to access the applications they were most interested in using (15.5%), others were concerned about the cost/expense of the Internet (14.7%) and thirdly, respondents commented on a need for more competition in the Internet marketplace. While not ranking among the top 3, other concerns enumerated in this section, included a desire for all lines to be laid underground, that Rockville had the capacity to be innovative and a national example in the area of telecommunications, concerns related to security and a desire for some type of universal service for Internet access.

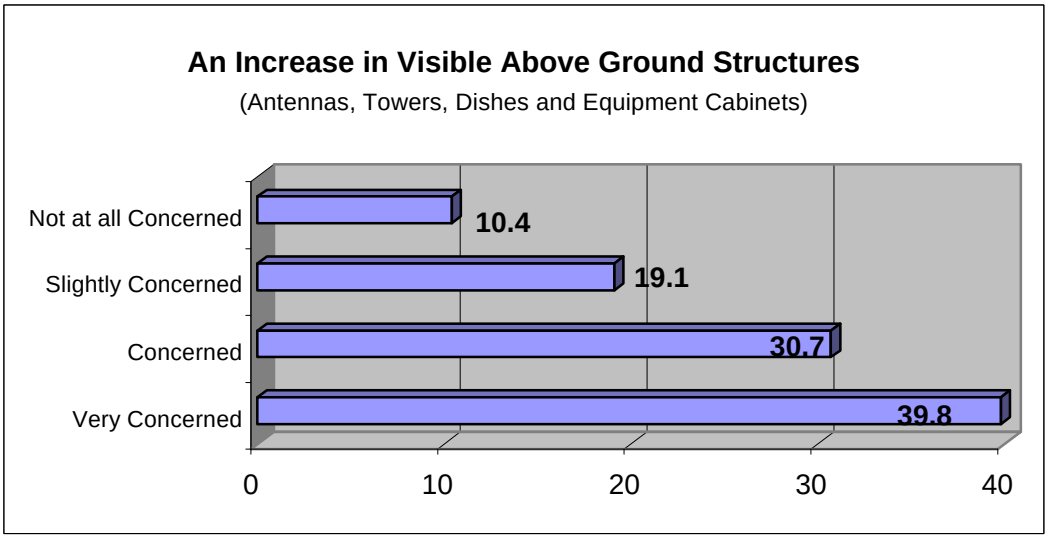
Infrastructure Placement in the Community

Respondents were asked to assess their level of concern with four key issues related to the future development of a telecommunications infrastructure. Concern was measured on a 4-point scale from "very concerned" to "not at all concerned".

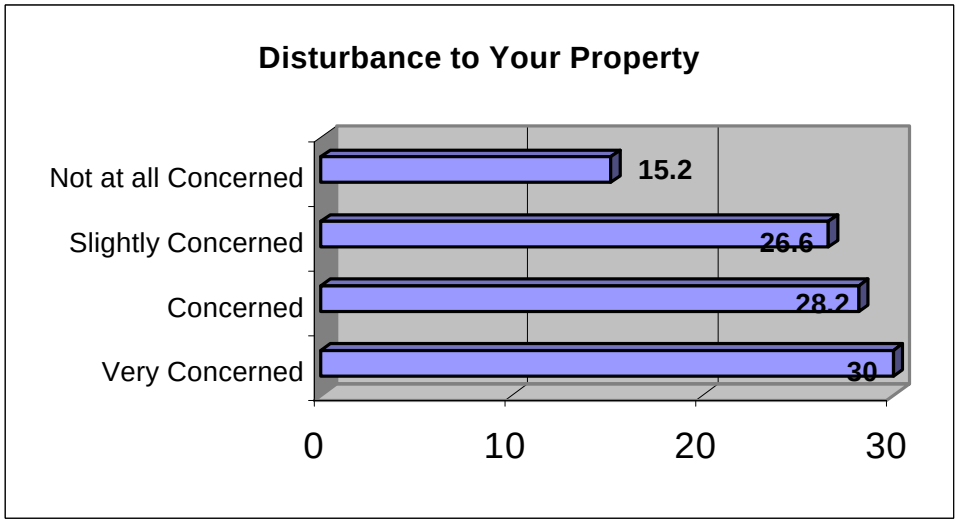
The most concern was expressed with "an increase in visible wires related to the implementation of new services" with just over 71% indicating they were "very concerned" or "concerned."

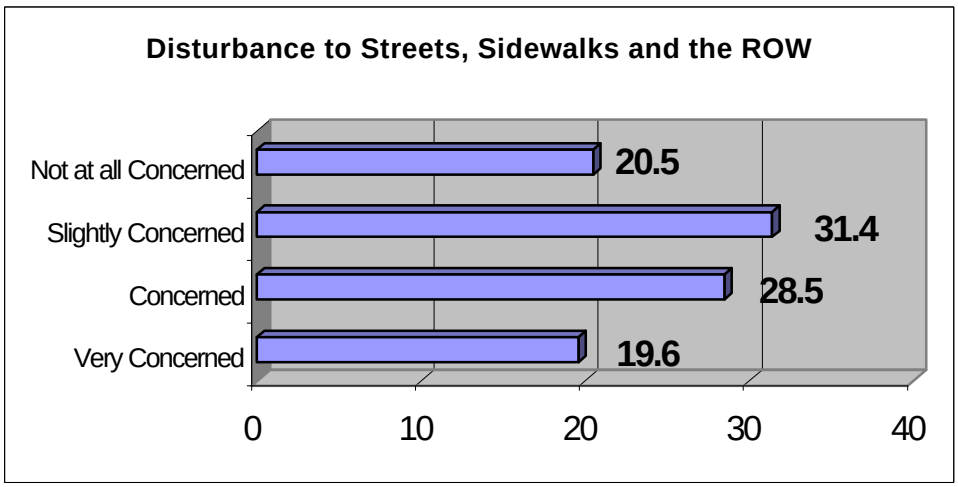


This was closely followed by concern related to "the increase in visible above-ground structures." with just over 70% indicating they were "very concerned" or "concerned."



About 60% of respondents expressed concern over the "disturbance to your property when placing wires for new services" and just about 50% expressed concern related to the "disturbance to streets, sidewalks and other rights-of-way when placing wires for new services."





Additional Comments

Respondents were given a final opportunity to make comments related to infrastructure placement issues, and 224 (15.4% of respondents) did so. When considering the top 3 comments, most often respondents expressed a desire for cable wires to be buried (31.7%), followed by expressed dissatisfaction for the restoration of property once cabling has been completed (28.6%) and lastly, unauthorized digging, tree pruning and lack of notification regarding digging (5.4%).

While the survey did not test issues focused specifically on cable television, several respondents took this opportunity to express dissatisfaction with the monopolistic status of cable television, the installation of cable wires before 8:00am and after 6:00pm, that cable prices are too high, telephone solicitation for cable is too frequent and a general dissatisfaction with cable television service overall.[6]

Advanced Statistical Analysis

In an effort to better understand how the items tested were interrelated, an advanced statistical measure was conducted. Called an Analysis Of Variance (ANOVA), this statistical procedure compares differences between and within measures and then offers a significant score. An ANOVA was run between overall satisfaction with the local telephone company's customer service and other tested items in the instrument.

The issues found to be significantly related to telephone service were reviewed using crosstabulations in order to understand the direction of the relationship. While telephone service in general received positive ratings, a review of the significant relationships indicated that those who expressed more dissatisfaction with telephone service, are younger, more concerned about the future disruption of property, more technologically involved (own computers, cellular phones and telecommute) and more educated. In other words, as a respondent in Rockville reached out to the telephone company and other resources for advanced technology needs, the sentiment of dissatisfaction grows. This trend is of concern to the City, because it reflects a problem likely to be amplified as technology continues to be diffused at a rapid rate in Rockville, Maryland. At the same time, this finding affirms the critical need for the proactive telecommunications planning currently being conducted by the City.

The significance of the relationship between two items is represented by an "F" score. F scores represent the output of mathematical equations analyzing the differences between and within rankings for two items. Only F scores with significance at 99% and 95% are reviewed in the table below. In other words, the significant relationships discussed above and listed below were found to be likely between 99% and 95% of the time. These scores are generally considered to merit consideration among statisticians.

The following table lists the items that were significantly related to question 3 in the survey, "How would you rate the local telephone company's overall customer service?" Of note, the term "service" did not include rates.

[6] Comments related to cable television appeared to account for about 45% of the additional comments made in the last comments section of the survey.

Significantly Related to Overall Telephone Company Service Rating	**F Score .000=99% Confidence .05=95% Confidence**
Age 31-40	.025
Age 81 and Above	.01
Sound Quality Score	.000
Repair Service Score	.000
Billing Practices	.000
Price Rating	.000
Installation Rating	.000
System Reliability Rating	.000
Has the telephone company been responsive to service problems?	.000
How would you rate the prices charged by the local telephone company?	.000
Do you currently use a cellular telephone?	.020
Do you own a personal computer?	.000
Do you currently telecommute?	.050
Disturbance to your property concern.	.002
New Residents	.000
Higher levels of education.	.010

Conclusion

The results of the telecommunications needs and interests ascertainment in Rockville, Maryland offer the City timely and critical information in which future telecommunications based decision-making can be firmly rooted in evidence. The key findings in this survey are summarized below, followed by a series of recommendations that the City might find useful as it plans for the future.

The responding sample in the Rockville telecommunications assessment indicates that the City is composed of an urbanized, educated and affluent working population. In most areas, the residents of Rockville are heavy users of new technologies. The findings and recommendations that follow are based on the quality of life issues related to technology as reported by the residents of Rockville.

1. Residents of Rockville report a level of dissatisfaction with telephone rates and expressed in written comments dissatisfaction with slamming and surcharges they experienced with their telephone service. Rockville residents relationship with telephone providers is of considerable importance at this time, because while almost 40% already have a second phone line, another 17% indicated that they would be attempting to acquire one in the near future. In addition to that finding, just over 50% of respondents now have a cellular phone and another 7% indicated they would acquire one in the near future. These findings indicate a significant level of activity between residents and local telephone service providers in the near future.

Recommendation: A community empowerment campaign might aid in a better understanding of surcharges and rates included on the telephone bill. While not a guarantee to ease complaints regarding rates, an understanding of the rates' purpose and the means in which a telephone customer can file a complaint at the state and federal level may be beneficial. Perhaps working with the state and the telephone company to provide information in the monthly bill, including information on the City's or Rocknet's website regarding how to file a complaint and links to federal information on common carrier service in the United States would empower the local resident. Whatever other initiatives are taken, the City should continue to work through avenues open to it to promote competition in the local market. Ancillary to such efforts, residents would also benefit from information related to local, state and federal attempts to provide choice in local telephone service. Such information could be provided in a special telecommunications section on the City's website.

2. At home computer use and Internet use in Rockville are almost twice the national average. A majority of residents in Rockville report that they spend between 1 and 2 hours a day on-line from home. Almost 61% of residents reported increasing the speed of that on-line connection would be of value to them. Over 26% of residents in Rockville reported telecommuting and another 49% said the ability to telecommute via a high-speed infrastructure would be of benefit of them. These figures combined represent 75% of respondents.
   Recommendation: Based on the results of this survey, providing Rockville residents with a faster, more efficient means of accessing the Internet from home would have considerable impact on the quality of life of the local community. The support and creation of an infrastructure that allowed more work from home is likely to ease urban traffic congestion, allow more quality time at home and thus likely to increase a sense of community in Rockville. In the words of one resident, "Rockville, Maryland has the capacity to be an example for the rest of the nation."

3. Because of the high use of home computers and the Internet, residents indicated a high degree of interest in City provided web-based services and specific computer applications that would be of benefit to them.
   Recommendation: Services related to those specifically indicated by residents, as well as those addressed in the findings regarding telecommuting, should be reviewed and considered for adoption. Services indicated as desirable were: general information and responses to questions about City services, registration for City offerings, completing surveys on-line, accessing survey results and applying for permits. Considerable interest was also expressed in on-line employment applications and information, community events calendars and the ability to correspond with City employees via electronic mail. Each of these categories express a desire to replace a previously required telephone call and/or visit to the City office with electronically accessed information. According to the information gathered in this survey, there appears to be a significant number of new residents in Rockville. The City might want to consider developing a specific web page within its City website dedicated to new residents and linking them to needed information.

In regard to desired applications, the City should work with Rocknet and other non-profit, community-based organizations to potentially provide links to shareware available at no charge via the Internet. A branch of the City or Rocknet may also consider working with software companies to provide limited access to select software via a secure web page.

4. Residents of Rockville indicated significant levels of concern with visible above ground telecommunication structures, an increase in visible wires, disturbance to property and disturbance to streets, sidewalks, and the right-of-way.
   Recommendation: Along with a desire for more telecommunications services, comes a concern in Rockville with the environmental issues that occur with development. Efforts should continue to be made to consider using existing dedicated towers, antennas and other structures to co-locate new services. The City might also consider opening a conversation with residents regarding the placement and granting of permits for builds within the community. This will likely increase and enhance communications with the public and the resulting dialogue may serve to promote the most palatable solutions, especially for large scale projects. Beyond the outreach currently being engaged in by the City, a "conversation" could be held electronically or via a dedicated phone line. Considering the interest in electronic City information, this avenue could also be utilized for alerting residents to new construction that might disturb streets, sidewalks or the ROW. Proactive management of the ROW and local environment has the capacity to further empower Rockville residents.

The previously mentioned findings and recommendations, which are rooted in the data collected from over 1400 residents of Rockville, offer the City a starting point in which future decisions regarding telecommunications can be made. By rooting decision-making in the needs and interests of its community, the City increases its likelihood of successfully meeting the challenge of proactive telecommunications decision-making.

Appendix A
Marked Residential Survey Instrument

Rockville Residential Community Telecommunications Needs Assessment Survey
(N=1451)

1. How many people in your household are in these age ranges?

Below 10: (N=254)

Number	Percentage
1	53.1
2	37.4
3	8.7
4	.4
5	.4

11-20: (N=225)

Number	Percentage
1	56.0
2	35.6
3	5.8
4	2.2
5	.4

21-30: (N=161)

Number	Percentage
1	67.1
2	29.8
3	1.9
4	.6
5	.6

31-40: (N=329)

Number	Percentage
1	54.1
2	43.8
3	1.5
4	.3
5	.3

41 – 50: (N=350)

Number	Percentage
1	61.4
2	37.4
3	.9
4	.3

51-60: (N=352)

Number	Percentage
1	56.3
2	43.5
3	.3

61-70: (N=352)

Number	Percentage
1	62.2
2	37.5
3	.3

71-80: (N=228)

Number	Percentage
1	68.4
2	31.6

81 and Above: (N=69)

Number	Percentage
1	88.4
2	10.1
3	1.4

Telephone Service

2. On a scale of 1 to 5, with **1 being unacceptable** and **5 being excellent**, please rate each of the following aspects of your local telephone service within the last two years or indicate "N/A" if it does not apply.

4.1	Sound quality	2.9	Prices
3.7	Repair service	3.7	Installation
3.7	Billing practices	4.3	System reliability

3. How would you rate the local telephone company's overall customer service? *(Customer service means installation, repair, billing and responsiveness, but not price.)*

33.5 Very Good
46.8 Good
14.9 Fair
3.1 Poor
1.3 Very Poor

4. Has the telephone company been responsive to service problems?

18.6	Very responsive	1.3	Not at all responsive
29.1	Responsive	31.0	Never had a service problem
13.2	Somewhat responsive	6.8	Don't know

5. If you called for service, how soon after your call was the problem resolved?
1 day 25.7 2 days 20.2 3 days or more 11.5 Never needed service 42.7

6a. Do you presently have a second telephone line? Have 38.1 Don't have 61.9

6b. If not, are you considering getting a second telephone line? (N=885)
Want 29.7 Don't want 70.3

For what purpose: Top 3 Responses N=309 or 23%
1. Computer 47.6
2. WWW Internet 35.0
3. Business from Home 4.2

7. On average, how much is your monthly local telephone bill? *(Rounded to the nearest dollar)*
$52.01 (Mean)

$30.00 (Mode)

8. How would you rate the prices charged by the local telephone company for residential telephone service?

13.8	Very high	0.3	Somewhat low
55.5	Somewhat high	0.4	Very low
19.5	Right amount	10.6	Don't know

9. Would you be likely to change to another local telephone service if it were available to you?
Yes 38.8
No 61.2

10a. Do you currently use a cellular telephone? Yes 50.5 No 49.5

10b. If yes, how valuable is your cellular service to you?

25.9	Very valuable	3.4	Not valuable
35.2	Valuable	5.4	Don't know
30.1	Somewhat valuable		

10c. If no, do you anticipate that you will get a cellular telephone in the near future? (N=682)
Yes 21.7 No 78.3

11a. Do you currently use a pager? Yes 17.1 No 82.9

11b. If yes, how valuable is your paging service to you?

36.0	Very valuable	8.1	Not valuable
29.2	Valuable	14.0	Don't know
12.7	Somewhat valuable		

11c. If no, do you anticipate that you will get a pager in the near future? (N=1131)
Yes 4.5 No 95.5

12. Do you have any other comments regarding your telephone service? N=289
Top 3 Responses

1. Prices (usually commented regarding taxes and surcharges)	29.8
2. Satisfied/Happy with service	13.5
3. Dislike telemarketing calls	10.0

Internet Access and Other Data Communications Services

13a. Do you own a personal computer? Yes 76.5 No 23.5

13b. If yes, are you connected to a modem? (N=1115)
Yes 83.5 No 16.5

13c. If yes, if you know your modem connection speed, please list it here:
Top 3 Responses

1. 56.0K	42.6
2. 28.8K	26.0
3. 33.0K	19.0

14a. Do you currently have Internet service at home? (N=1302)
Yes 62.8 No 37.3

14b. If yes, who is your current Internet Service Provider?
Top 3 Responses

1. America On-Line	32.8
2. Erols	29.9
3. AT&T	3.1

14c. On average, how much time per day do you spend on-line at home?
1.48 Hours (Mean)/ 1.5 Hours (Mode)

15a. Do members of your household access the Internet at any of the following locations? *(Check all that apply.)*
52.2 Work 8.5 Library 8.7 School N=24 Other: Friends house 29.2
Relative's house 25.2
Senior Center 12.5

15b. What location is your primary access to the Internet? *(Check only one.)*

56.4 Home	2.1 Library
38.1 Work	1.1 Other *(Specify)*
2.4 School	

16. On a scale of 1 to 5, with **1 being unacceptable** and **5 being excellent**, please rate each of the following aspects of your Internet service or indicate "N/A" if not applicable.

4.07	Billing practices	3.66	Price
4.47	System access (busy signals)	3.81	System reliability
4.05	Ease of use	3.64	Customer service representative knowledge
3.82	Ease of contact with Internet Service	3.93	Customer service representative courteousness

17. Until now, many Internet users have been able to connect at speeds of up to 28,800 to 56,000 bits per second (28.8 to 56 Kbps) through their Internet Service Providers. Now some providers, including the local cable TV company, are beginning to offer higher speed Internet access, at speeds ranging up to 10,000,000 bits per second (10 Mbps) or more.

Is it valuable to your household to have such higher speed Internet service available in Rockville? (N=1088)
Yes 60.8 No 39.2

18. Do you currently telecommute (i.e., work on-line from home or remote location)? (N=)
Yes 26.4 No 73.7

19. If greater telecommuting capabilities from home were available, including greater access to on-line services from government agencies and other organizations, would there be a benefit to you? (N=1072)
Yes 49.1 No 50.9

(If Yes, please describe)

Top 3 Responses (N=296)
Work from home = 29.1
Telecommute Ability = 22.0
Faster speeds = 12.5

20. Which of the following types of services are you most interested in seeing the City provide interactively on line?
    - 54.1 General information and responses to questions about City services
    - 45.9 Registration (Recreation classes, etc.)
    - 18.3 Employment applications
    - 29.0 Permits (building, etc.)
    - 39.1 Surveys (e.g. regarding traffic concerns, bikeway development, other subjects)
    - 10.3 Other *(Specify)* Community Events=10.7, Cultural Events=10.1, Obtain regulations, zoning laws = 9.4
    - 12.7 Don't know

21. Do you have any other comments regarding your Internet or other data communications service?
    Top 3 Responses (N=116)
    Speed = 15.5
    Expense/Cost = 14.7
    Competition = 12.1

Infrastructure Placement in the Community

22. How concerned are you with the following infrastructure issues as they apply to future development of telecommunications systems and services within your community? *(Please check the appropriate box.)*

Tested Issue	Very Concerned	Concerned	Slightly Concerned	Not At All Concerned
a. Disturbance to streets, sidewalks and other rights-of-way when placing wires for new services	19.6	28.5	31.4	20.5
b. Disturbance to your property when placing wires for new services	30.0	28.2	26.6	15.2
c. An increase in visible wires related to the implementation of new services	41.2	30.2	17.8	10.8
d. An increase in visible above-ground structures such as equipment cabinets, pedestals, antennas, towers and satellite dishes related to the implementation of new services	39.8	30.7	19.1	10.4

23. Please describe any problems you have previously encountered related to any of the above issues:

Top 3 Responses (N=224)

Cables should be buried	31.7
Generally dissatisfied with work and lack of restoration of area	28.6
Unauthorized digging/tree pruning/notification of digging	5.4

Demographics

So that we may consider your opinions with others like yourself, please indicate the following:

24. Zip Code (N=1416)

1. 20850	51.2
2. 20851	20.3
3. 20852	15.0
4. 20854	13.1
5. 20853	.4

25. Own or Rent? Own 87.0 Rent 13.0 (N=1397)
26. How long have you lived in Rockville? 1 year=(Mode), 19.8=(Mean) (N=1409)
27. How old were you on your last birthday? *(Optional)*
    56.2 =(Mean), 40=(Mode) (N=1139)
28. Male or Female? *(Optional)* Male 56.7 Female 43.3 N=1217

29. Highest grade completed? *(Optional)* (N=1153) 16=Mean and Mode (college degree)

9	.2
10	.2
11	.2
12	14.2
13	.7
14	6.1
15	1.3
16	31.6
17	1.1
18	26.8
19	.6
20	16.1
21	.3
22	.3
24	.2
25	.2

30. Race? *(Optional)* (N=1022)

Caucasian/White	90.9
African Amer./Black	2.6
Hispanic/Latin	1.9
Asian Indian	.3
European	.4
Other	.2
Asian	2.7
Native American	.1
Korean	.1

31. Income? *(Optional)* N=488

100k (Mode)

$72,159 (Mean)

Appendix B
Summary of Open Codes in Rockville Residential Community Telecommunications Needs Assessment

(Open Codes are Listed in the Order that They Appeared Initially as the Surveys were Coded)

6.B. If not are you considering a second phone line?
For what purpose:

1. --
2. WWW (Internet)
3. Business from home
4. Telecommuting
5. Computer
6. Fax
7. ISDN
8. Children/Teenager
9. Emergency line
10. Location

12. Do you have any other comments regarding your telephone service?

1. --
2. Dislike telemarketing calls.
3. Static/interference/sound quality
4. Competition
5. ISDN at a lower flat rate
6. Lengthy response
7. Price(usually involving taxes and surcharge)
8. Would like package(cell, local, long distance) plan
9. Poor Customer Service
10. Call forwarding
11. Simplify phone bill:
    - too many pages
    - too confusing
    - too many options
12. No reward for loyal customers.
13. Satisfied/Happy with service.
14. Interested in Fiber Optics/upgrades/digital.
15. Concerned about privacy.
16. Installation/repair problems:
    - slow installation experience
    - bad installation experience
    - bad repair experience
17. Should not charge for unlisted numbers.
18. Considering ISDN line.
19. The City should not be involved with communications.
20. Cellular service provider is inefficient.
21. Too many services/options/companies.
22. Good for voicemail.
23. -- (changed to #4)
24. General Quality issues.
25. Bill local and long distance separately.
26. Would like more detail about charges.
27. Should not have to pay for phones.
28. Why do we pay 911 fee for second phone?
    ($3.50 x 2=$7.00)
29. They need an accurate grid of outside lines.
30. CallerID & Call Waiting should be free.
31. All Rockville addresses should be local.
32. All new wiring should be underground.
33. Too many service interruptions/disconnects.
34. Let customers know when they will be working on the lines.
35. Frequent “Slamming”
36. Phones always need repair/replacement.

37. Long distance selection problem
    (survey 807 has detailed response).
38. Monthly fee should pay for voice & data quality.
39. It takes too long for connection to be made.
40. Should not have to pay 911 charge.
41. Not enough physical lines in neighborhood.
42. Live in old house with old wiring, would like new wiring.

13. C. If yes, if you know your modem connection speed, please list it here:

1. 56K/57,500
2. 33K
3. 28.8K
4. 19.2K
5. 14.4K
6. 2800
7. 128,000 (ISDN)
8. 97,500
9. 45,333
10. 2600
11. 9600
12. 512K (cable modem)
13. 46,333
14. 115,000

14.B. If yes, who is your current Internet provider?

1. N/A
2. AOL
3. Erols
4. Heller HIS
5. MCI
6. Megsinet
7. Montgomery Co. Schools
8. Sprint
9. Work
10. AT&T
11. Mindspring
12. Juno
13. Sysnet
14. Clarknet
15. Montgomery Cable TV
16. Compuserve
17. CAIS
18. Sierra Club
19. Bell Atlantic IS
20. Prodigy
21. IBM Net
22. Earthlink
23. Network Connection
24. One Line Gateway
25. Presscom
26. Verio
27. PSI & ISP
28. Pressroom
29. CapAccess
30. Digizen
31. WEB TV
32. IBN
33. NTR.NET
34. UMCP
35. Net Com
36. N.I.H.
37. Millkern
38. Tidal wave
39. Compaq Comp. Corp. Network
40. VNI
41. MSN (Microsoft)
42. Net Connector
43. Campus Net
44. GTE

45. Virtual Networks Inc.
46. Visionary Network (Visi.net)
47. Forbin
48. Crosslink
49. Washington Apple Pi (WAP)
50. Cap City
51. CPCUG
52. Wizard Net
53. Ricochet
54. Laser.net
55. Concentric
56. Digital nation
57. U U Net
58. Radix.net
59. Intercom
60. Internet Express (Damascus)
61. US.net
62. Digex
63. Communications Plus
64. Express Net
65. TIAC
66. Ex-Prossnet
67. AMI
68. Cable & Wireless
69. World Com
70. Sprynet
71. Tritium
72. Institute for Global Communication
73. Monumental Networks
74. Infinite Data Source

14.C. On average, how much time per day do you spend on-line at home?

1. --
2. 30 min - 1 hour
3. 5 - 10 minutes
4. 30 minutes per month
5. 1 - 2 hours
6. 2 - 3 hours
7. 10 - 30 minutes
8. 3 - 4 hours
9. More than 10 hours
10. Less than 5 minutes
11. 5 - 10 hours
12. 4 - 5 hours

15.A. Where else do members of your household access the Internet?

1. Home
2. Church
3. Senior Center
4. Relatives house
5. Friends house
6. Lake Forest
7. Museum
8. Computer Store

15.B. What location is your primary access to the Internet? Other response.

1-4 Tested on Instrument

5. Senior Center
6. Relative house
7. Friends house
8. Church
9. Computer store

20. If greater telecommuting capabilities were available, including greater access to on-line services from government agencies and other organizations, would there be a benefit to you? If yes, please describe?

1. Work from home
2. --
3. Telecommute Ability
4. Faster response time
5. Applications & Permits
6. Lengthy Response
7. Lower Costs
8. Save environment (less pollution)
9. Education/training
10. Access to data, better informed
11. Faster speeds
12. Would like e-mail to city government offices
13. Need voting on-line
14. Enhance quality of life
15. Increase community involvement with government
16. Convenience (time savings)
17. Library services
18. Research
19. Faster file transfers/downloads
20. Cross platforms (Windows to Unix)
21. Increase efficiency/productivity
22. Improvement in entertainment
23. Want ASDL/ADSL
24. College Recruiting
25. Ease of use
26. Internet phone service

20. Which of the following types of services are you most interested in seeing the City provide interactively on-line? "Other" Category

1. Cultural Events
2. Library book renewal & reservation
3. Lengthy response
4. Voting/Polling/Candidate info.
5. Police Reports
6. Education/Schools
7. Community events (calendar)
8. Publications
9. Request for services (i.e. street repairs)
10. Services schedules (Snow removal, garbage, leaf removal, recycling info.)
11. Obtain regulations, zoning laws
12. Communication/e-mail with Mayor, city council, and city employees
13. Economic Development
14. Utility bill payments
15. Live videocam at key locations
16. City Newspaper
17. Swimming pool/recreation schedule
18. Senior Center Schedule
19. Help in emergencies
20. Shopping/business
21. Meeting agendas/minutes
22. City budget/master plan
23. Dog licensing
24. Maps (bike paths, recreation and historical locations)
25. employment opportunities
26. School information (bus schedule, closings)
27. Volunteer opportunities
28. Public health information
29. Public service announcements for non-profits
30. Dept. of Motor Vehicles
31. Bulletin Board Discussions/Citizen Forum
32. Ticket for functions provided by city hall
33. Travel info/Metro/D.O.T.
34. Local sports info
35. Request for interpreters
36. Demographics
37. Newsletter
38. Requests for bids
39. Better Business Bureau Info
40. Real estate listings
41. Dept of Revenue/Tax info.
42. Video of Government Meetings

21. Do you have any other comments regarding your Internet or other data communications services.

1. --
2. People who want it should pay for it.
3. Expense/Cost
4. All lines should be underground
5. No Additional Fees
6. Lengthy response
7. Reliability
8. Speed
9. Busy Signals
10. Want Bi-directional capabilities
11. Too much digging & laying down additional lines.
12. DSL
13. Competition
14. Expand library availability
15. Concerned about security
16. Happy/Satisfied with current service
17. City should provide more internet access at the senior center and recreation centers.
18. Would like to see internet access combined with cable service (cable modems)
19. It's hard to compare costs.
20. Would like free/inexpensive PC use and tutoring for vision impaired
21. Lack of support for the cable modem that I have.
22. Let's be a national example.
23. Need Local number for access
24. Planning for growth is important
25. Overrated for the average person/not interested.
26. More library terminals
27. Need improved security
28. Have 2nd line for modem/fax, another option would be great.
29. Don't want government involved
30. High speed internet connections should not tie up phone lines.
31. Do not offer cable modem if it is one-way ie. needs a phone line for return signal.
32. Need better ways to stop spamming.
33. Health Hazards (electromagnetic)
34. Don't want to pay extra for touch tone.
35. Do not tax internet service.

23. Please describe any problems you have previously encountered related to any of the above issues.

1. ---
2. ---
3. Installers of cable
4. Cable /telephone boxes on lawn.
5. Generally dissatisfied with work and lack of restoration of area.
6. Lengthy response.
7. Work on cable lines should be done M-F 8:00-6:00
8. Cables should be buried
9. Unauthorized digging/tree pruning/notification of digging.
10. Concerned about leasing/use of public space by private communications co.
11. Transco Easement.
12. Pedestals should be hidden.
13. Unsightly monopole/antennas/structures
14. Cables getting sliced.
15. Cable box in yard is unsightly
16. Service interruptions (reliability)
17. Trucks blocking roadway/driveway
18. Too many communication towers.
19. Wires buried too shallow
20. Cable TV company monopoly.
21. The more dishes and antennas that are put up the worse my reception is.
22. Possible radiation emissions from towers.
23. Ground currents on phone lines from cable TV.
24. Not enough infrastructure work being done.
25. Unhappy/Dissatisfied with Cable Company.
26. Tree trimming around trees has been neglected.
27. Cable prices are too high.
28. Frequent Cable TV sales calls.
29. I want more cellular towers so my cellular service will be better.
30. Need better telecommunications.

25.

1. Own
2. Rent

28.

1. Male
2. Female

29. Education

12 - High School
14 - Associate Degree, Nursing school
16 - Bachelors Degree
18 - Masters Degree
20 - Anything above a Masters Degree

30. Race

1. Caucasian/White
2. African Amer./Black
3. Hispanic/Latin
4. Asian Indian
5. European
6. Other
7. Asian
8. Native American
9. Korean

Appendix 11

Rockville Business Telecommunications Needs Assessment

Introduction

As part of the City's broad effort to gather information related to telecommunications, Rockville business and organizations were administered a mail survey. The survey was designed to assess current levels of satisfaction with telecommunications technology in use and assess for future telecommunication needs. The survey was mailed to a number of area businesses and organizations. In all, 27 surveys were returned and analyzed. This report offers a review of those findings by River Oaks Communications and Constance Book, Ph.D.[7]

Respondents

Of the 27 respondents, most were small businesses involved in retail. The reported number of employees ranged from 1-1000 with the mode at 3. Beyond retail, other respondents were involved in banking, business services (research, communication, information management, etc.) and residential services.

Businesses were asked if they had satellite offices and a majority indicated that they did not. Of those that had satellite offices, most were bank branches or the Rockville business surveyed was a satellite office to a larger company.

All of the business representatives responding to the survey were managers, presidents or in other leadership positions within the business or organization.

Findings

When asked who provided the business with local telephone service, all indicated Bell Atlantic. Respondents were asked to rank the service provided by Bell Atlantic on a variety of issues. A scale of 1 to 5 was used, with 1 being unacceptable and 5 being excellent.

The following table illustrates the service issues and the mean score ratings across respondents.

Service Issue Tested	Mean Score
1. Sound Quality	4.2
2. Repair Service	3.6
3. Billing Practices	3.3
4. Prices	2.6
5. Installation	3.7
6. System Reliability	4.1

[7] Follow-up phone calls were made to area businesses that had been sent a survey, but did not yield many additional completed instruments. In order to gather more information, River Oaks Communications also conducted an in-depth focus group with area business people. Focus group results are described later in this Appendix.

The telephone company scored its highest marks in regard to sound quality and system reliability, each scoring above 4 on average. The telephone company's lowest scores are related to pricing (2.6) and billing practices (3.3). These scores fall in the "fair" range. Moderate, but leaning toward "good" were scores given for repair service and installation.

When asked to rank the telephone company's service record overall, excluding price and using the same scale, the average score was a 3.6.

Most respondents found that the telephone company had been "very responsive" or "responsive" to their service problems. Fifteen percent of respondents indicated that they had never had a service problem. Over 7% described the telephone company as "somewhat responsive" and 4% described the phone company as "not at all responsive" to their service requests.

When asked how soon after placing a call requesting service that the telephone company responded, 33% indicated that service response was the same day, 30% indicated it was within two days and 11% indicated that it had been three days or more. The remaining respondents had not needed service.

Almost all respondents reported a second phone line in use at their business (84%). Of those that did not have a second phone line, only a few indicated that they would acquire one and noted that it would be used for the FAX machine and data exchange.

When asked about their monthly phone bill, respondents reported spending between $20 and $10,000 dollars a month. The most frequent response (given by 3 respondents) was $600. Excluding the high response of $10,000 dollars per month, the mean monthly expenditure was $494 (the mean rises to $891 per month if the $10,000 charge is included). A majority of respondents described the rates charged by the local telephone company as "very high" or "somewhat high" (a combined 85%). Eleven percent indicated that the telephone company charged the right amount.

Sixty-five percent of responding businesses would be likely to change to another local telephone service if it were available.

Thirty-seven percent of responding businesses indicated that they used a cellular phone as a means to conduct business. When asked how valuable that service was, 39% described it as "very valuable" and 15% said it was "valuable". Of the remaining respondents, 23% described it as "somewhat valuable" and 15% indicated "not valuable".

Only a few businesses reported using other communications service providers than Bell Atlantic as part of conducting business. These "other" providers included Nextel, Pagenet, AT&T and Unisys.

Respondents were given a final opportunity to make comment regarding their telephone service and several respondents did so. Most comments were related to billing practices.

One remarked on slamming practices and asked Bell Atlantic to do a better job of monitoring long distance providers and their billing methods. Another respondent said that they would like to receive a separate bill for long distance. One respondent indicated that installation and connection charges were too high and another noted poor customer service in general.

A series of questions related to current and future use of other technologies was also posed.

The most commonly reported technology in use was the FAX machine, in use by 75% of responding businesses. The FAX machine was in use most often for processing orders and communicating with other businesses. Another 11% reported that they anticipated acquiring a FAX machine in the future. Problems encountered with the FAX machine were related to the hardware, such as paper jams and the quality of the received FAX.

Electronic mail, the Internet and networked PC workstations are reported in use in 37% of businesses and another 22% anticipate using these services in the future. When considering how these technologies are used, most reported that electronic mail was used as an extension of telephone functions. E-mail aids responding businesses in the processing of orders and communicating with customers and other employees. The Internet and networked workstations are used for the exchange of information, research and data/document exchange.

Audioconferencing for holding meetings and for business communication was reported currently in use by 30% of respondents. Another 7% are interested in acquiring the ability to audioconference in the future.

Voicemail was in use by about 26% of respondents. Voicemail was reported as currently in use as a messaging feature so that businesses didn't miss phone calls.

Document scanning was used by about 26% of respondents for the digital conversion of graphics. Future use of a scanner was anticipated by 15%. Future uses of a scanner included archiving documentation.

Automated telephone response and paging services were in use by about 15% of respondents as a way to stay in touch with customer needs. An additional 7% indicated that they would be interested in acquiring these technologies in the future as a way to retrieve immediate messages. The only problems encountered with these two services were related to the features of the hardware that facilitates them.

Telecommuting was currently being used by about 11% of respondents and future telecommuting was desired by 15% of respondents. One respondent noted having problems managing telecommuters.

Teletraining, cable television and satellite/microwave signal reception were reported in use by only a few respondents. Most reported it as a way to train employees and gather information. No problems were reported with these technologies.

One respondent has ventured out and attempted to use Internet telephone service as a way to reduce telephone costs. The only problem reported was related to lag-time in the voice transmission.

Videoconferencing was not reported in use by business survey respondents, but was indicated as desirable for future use. A few respondents reported a need for videoconferencing to hold "face-to-face" discussions, enhance working relationships and perhaps conduct retail business.

Businesses were asked to estimate what percentage of their work they performed in-person, in writing, on the phone, over the Internet and through various other means. Most indicated that the bulk of their work was performed in-person, on average accounting for 61% of their service provision time. The second most common means of providing service was over the phone, on average utilized 36% of the time. The Internet accounted for 13.4% of service time. Written correspondence accounted for 6.6% of service time and the FAX for 5.4%. Imaging was indicated by one respondent, at 31% of their service time. In the "other computer communications" category, two respondents indicated that e-mail and digital information exchange accounted for 1.5% of service time on average.

Businesses were asked to indicate what segments of the professional community they currently communicated with on a regular basis. Six respondents indicated having regular professional communication with other organizations. These organizations and entities included: physicians' offices; insurance companies; federal and state government agencies; the general public; and other Aspen (national company) facilities.

Eleven percent of this regular professional communication was currently done via a computer connection. Another 11% hoped that they would be connected via computer in the near future. While none of the respondents had a video connection, one indicated that it was something that would be desirable in the future.

Businesses and organizations were asked about others that they might need to communicate with in the future. Several organizations were indicated, such as public schools, embassies, similar professionals, the general public, vendors and regulatory agencies. When asked why they needed to establish communication with these groups, reasons cited included marketing, retail, purchasing and design review. Seven percent indicated that they would need a computer connection with such entities and 3.7% indicated that a video connection would be desirable.

Businesses were also asked to consider what services they would like the City to provide interactively on-line. While most indicated that they didn't know (55.6%), several indicated that general information and response to questions provided electronically by

the City would be desirable (22.2%). Permits were desired by 14.8%, surveys by 11% and forms by 7.4%. In the "other" category, one business person indicated that a calendar of events was desirable and another indicated that demographic information would be helpful.
Lastly, the business community was posed a series of questions related to their overall telecommunication concerns. These included a ranking of 10 key issues by importance, as well as questions on short and long term telecommunications needs.

When considering issues by importance, the number one concern of most business respondents was reducing the cost of telecommunications, followed by increasing the reliability/availability of current systems, establishing Internet access, increasing the availability of redundant or back-up networks and establishing more point-to-point connections. Several other issues were ranked lower in importance, all at about the same level: placement of below and above ground telecommunications facilities; establishing more peer-to-peer computer connections; establishing network capacity for additional users; resolving difficulties in the areas of zoning, permitting, right-of-way access or easement acquisition; and faster/greater computer communications.

Short-term goals indicated by businesses included a desire for high-speed Internet access (15%), more computers, cheaper phone service, facilitating a customer's ability to access the business's services from home and telecommunications installations without excessive fees and permits.

Long-term goals indicated by businesses also included high-speed Internet access, more computers, and Internet set-up.

Forty-four percent of respondents indicated that they currently had a website and 56% indicated that they did not.

Conclusions

Since a majority of the businesses that responded to the City's request for information regarding telecommunication needs were small businesses, the results of this survey offer a perspective and trends significantly focused on this business sector. Businesses responding to the City's survey indicate a desire to maintain costs related to technology expenditures. Cost of local telephone service was considered too high by most businesses and 65% indicated that they would be likely to give a competing local telephone company an opportunity to provide service to their businesses.

When considering the benefits of various communications technologies, most respondents indicated a desire to receive the full value of the technologies they were currently using. This is evidenced by comments from respondents related to expanding use of their voicemail, E-mail and Internet access. Like the information gathered from City departments (detailed in another Appendix), businesses in Rockville appear interested in how enhanced use of current technologies can in-turn enhance

communication with their customers/clients and improve the quality of the business they conduct.

This trend among business is evidenced in the information they provided related to current and future use of technologies, as well as the problems they encountered using these technologies. For example, a majority of businesses reported using a FAX machine, several also indicated specific future uses for the FAX machine and were able to articulate problems related to the use of the FAX machine. On the other hand, technologies such as videoconferencing that were not currently in use, were least likely to have specific, planned future uses.

Having been introduced to computer communication, businesses are indicating a desire to branch out in this area. Respondents indicated six entities (primarily their customers) where they would like to extend and enhance electronic communication.

When asked about overall concerns, the cost of new technologies and the implementation of new technologies remained a primary concern among businesses. Beyond that, businesses expressed concerns related to making sure the systems they currently have are reliable and have redundant safeguards.

High-speed Internet access appears as a short-term and long-term goal for businesses, as well as maintaining technologically up-to-date computers on site.

Almost half of the respondents now include information about their business on the Web. The desire for new computers and high-speed Internet access appears to be related to the future potential for electronic commerce.

While the responding sample was not as large as hoped, the City can use the information gathered during this survey, and during focused discussions with area business people, to ensure that the needs and interests of this important group in Rockville are considered during telecommunications planning for the future.

Focus Group Discussion Results

On December 9, 1998, a focus group was held with several Rockville businesspersons. Participants represented the U.S. office located in Rockville of a large international pharmaceutical company, the Rockville office of a large information management services company, one of the largest hotels in Rockville, a small pet store and a printing company that has been operating in Rockville for 28 years.

Each of the participants had varying degrees of expertise and experience related to the implementation and use of telecommunications networks, systems and equipment. All were either the heads of their companies, general managers or managers of telecommunications and information systems.

Overall, the printing company executive expressed concern about the real utility of telecommunications technologies, the problems as well as opportunities created by their use and the replacement of personal services with impersonal technology. The pharmaceutical representative talked about the need for a well functioning wide area network and the importance of her company's international network to its operations.

The hotel general manager talked about the dramatic changes in requirements for telecommunications services and infrastructure in the hotel industry in order to support the needs of hotel guests. This has led to a significant expansion in external connection capacity to facilitate Internet access and other electronic communications.

The pet store owner talked about the use of electronic communications in her business that was occurring in very targeted ways, such as the attractiveness of pet videos on the store's web site. The information management services vice president indicated that one of the most important issues facing his company was the continuing integration of various forms of critical electronic communications, including telephone, computers and the Internet.

Voice Communications

Regarding voice communications, users employed a variety of systems ranging from large PBX systems with redundant connections to smaller PBX systems, Centrex services and multiple business lines. Some of the larger businesses employ automated response units (ARU). Group participants expressed several themes and concerns related to use of the phone systems and services they currently employ, including:

- Full understanding and use of features - Group members indicated that some features of their current phone system were going unused because staff was either not receiving adequate training or was not retaining and using knowledge related to the features. Some participants indicated that their current technology exceeded their needs, and procurement of some types of systems may be more driven by wants than actual needs.

- Competition can provide better prices, more service diversity and redundancy - Where participants were utilizing competitive carriers, they were receiving better prices, but also desire packaged services from the same company for ease of billing. Competitive services also increase the capability of those that use phone services as profit centers, such as hotels, to derive revenues, because better profit margins can be obtained, as well as lower costs for the components of their own systems, such as T-1 trunk lines.

- Portable phone systems create business efficiencies - Both portable phone systems (such as 900 MHz systems) and cellular phones are important parts of facilitating high levels of efficiency in today's work environment.

- Slamming and other problems hurt local businesses - Participants had experienced problems with deceptive phone practices which have been time-consuming (creating lost productivity) to resolve.

- For the larger businesses, voice-data integration will continue to increase - Larger business respondents saw an increasing melding of voice and data services to facilitate efficient and productive electronic communications.

Data Communications

Concerning data communications, participants again indicated a wide range of needs and capabilities. The representative of the smallest business had one main computer and a web site providing details and anecdotes related to the business's services. However, the proprietor noted that she found communications to be more efficient through phone lines than through e-mail.

The hotel general manager indicated that its corporate focus was on an intranet system with corporate communications for 1,400 hotels through a centralized mainframe. Locally, the hotel was finding the need for an increase in both its internal data management system capabilities, as well as the services it needed to provide to hotel guests. Data traffic, as much as phone traffic, was driving the need to add more T-1 line connectivity. The general manager did indicate that local competition could improve the cost of such circuits, but at times national, corporate contracts for the 1,400 hotels may inhibit the ability to obtain savings on a local level.

The printing company executive indicated a large use of e-mail and electronic provision of job orders, and that slow connections could create problems for the business.

The representatives of larger businesses noted a variety of data communications applications. For example, the information services management company indicated that it found good high capacity services locally but that the costs were significant, and it was pursuing ways of consolidating services through shared communications lines, such as frame relay services, to lower communications costs. The company noted that it was unifying its voice mail and e-mail systems to enhance productivity and provide better and more information access to employees, but that it also found that overuse of e-mail and use of the Internet for non-work-related activities during work hours had created productivity inhibitors. It also noted that telecommuting could both increase productivity and create offsite work management problems. The company's representative again noted that overall employee education on the use of technology was imperative to enabling its full utility and efficiency.

The representative of the pharmaceutical company also discussed the importance of high capacity, high capability data communications to its operations. Integrally involved in the company's data communications system were high capacity remote access servers, the need for large bandwidth "pipes", the use of faster modems and the use of both dedicated T-1 services as well as frame relay services. The company had recently pursued T-1 circuits

from different vendors in order to ensure the overall reliability of their network but, at the same time, billing issues were created related to the use of multiple vendors.

Overall, group participants indicated that data communications services had significant importance to their businesses, but such communications needed to be managed properly. Additionally, where competition could create higher capacity at lower cost while not creating additional management problems, it was significantly beneficial to have those alternatives available.

Video Communications

Participants were asked several questions related to current or planned use of videoconferencing. All agreed that video communications were important to their businesses, but perhaps not always in the traditional ways that videoconferencing has been envisioned. For instance, some talked about video as a surveillance tool. Others talked about the importance of video for distance learning and training applications, as well as video archiving of records and information that could be available in a video-on-demand fashion. Additionally, video would be useful for small group collaborative efforts where group participants were in remote locations. The pharmaceutical representative noted that in many companies, including hers, the uses and cost of videoconferencing are researched nearly annually to determine whether and how it should be integrated into work operations. Participants indicated that often the numbers don't add up until the cost of desktop videoconferencing decreases further.

Participants then discussed that one potential role of the City could be to enable a videoconferencing center where group or even individual videoconferencing could be done in a very cost-effective manner because the facility would be shared. Participants felt that the City also could enable training of such videoconferencing use and that the investment cost could be amortized over a number of users.

Focus Group Summary

Participants were asked to summarize their overall concerns about the current and projected telecommunications environment in Rockville and the role that they thought the City should play in this environment. One representative indicated that, with the rapid pace of technological change where current systems could easily be outmoded in just two to three years, it was important to have the information available to pick the best tool, and also have access to low cost technology so that a reasonable amortization could be made. In light of this, this participant felt that the more the City could do to enable a multi-vendor environment, the more that low cost and the right equipment and services could be available. The smallest business representative indicated that the City needed to be more small business friendly than it heretofore has been. Specifically, the City should look at facilitating training in telecommunications technologies and services for small businesses. This participant also was in favor of enabling videoconferencing capabilities for small businesses. The hotel representative also echoed the education theme where the City could help facilitate the provision of information in order for businesses to make the best, most

informed decisions about telecommunications products and services. Another participant indicated that, while they didn't see the City being on the cutting edge of technology, they could certainly help facilitate that environment for the businesses within Rockville. One participant was significantly concerned that the City not take actions to negatively impact the climate. While it would be helpful for the City to facilitate telecommunications system development and competition, they were concerned about any increases in fees and taxes for telecommunications service providers, believing that consumers ultimately would pay for those as part of a rate structure. Finally, one of the participants was significantly concerned that the City be very proactive about obtaining input from minority-owned businesses about their potential special telecommunications service needs and that the City keep this in mind in the provision of its own services, including those provided electronically.

Recommendations

Overall, Rockville businesses indicated, in survey and other data gathered, a high degree of importance related to the use of telecommunications technologies and services in the conduct of their business and they expressed a number of concerns related to access to, and use of, such technologies and services. Analysis of this data leads us to the following conclusions and recommendations.

1. Businesses in Rockville expressed significant concern related to the cost of their monthly telephone bill and ranked the telephone company's billing practices lower then other service categories. Businesses also ranked "reducing telecommunications cost" as the area of most concern they had related to the implementation of telecommunications services and technologies.

Recommendation: Similar to the findings and recommendations related to the residential community telecommunications needs assessment, telecommunications service competition will be a key component in reducing service cost and increasing service diversity for the business community. Accordingly, as recommended related to the residential community, the City should use all avenues open to it to increase the level of service competition to meet business telecommunications needs. Since many new providers initially build backbone infrastructure to meet business needs, the City may consider working with prospective providers in its initial design reviews to modify or incorporate additional infrastructure to serve a greater portion of the Rockville business community. Regarding billing practices, the City may wish to review the expressed concerns related to monthly billing communications with both the State and the telephone company to address these concerns. Additionally, the City may want to work more proactively with the small business community through organizations such as the Greater Rockville Partnership to develop programs to provide information to businesses on various cost effective means of implementing telecommunications technologies.

2. Some businesses in Rockville indicated a lack of technology use based on limited understanding concerning how telecommunications technologies and services might benefit their businesses and expressed interest in receiving more information.

Recommendation: The City may want to work cooperatively with providers and organizations such as the Partnership to sponsor workshops regarding the benefits of telecommunications technology and services to both small and large businesses. Businesses especially indicated interest in ways to develop E-commerce and to increase methods and speeds of data/document exchange. Such areas could be showcased in the workshops.

3. Businesses in Rockville currently employing a high degree of telecommunications services and technologies, expressed concern with the reliability and capacity of existing services and systems and potential difficulties in extending the reach of their current communications systems.

Recommendation: An increase in competition would again provide options for redundant networking and gaining additional capacity from other providers to offset some of the expressed concerns. It will be important in this regard, to focus on expanding the availability of advanced infrastructure throughout the City in order to address concerns about extending the reach of communications systems, including creating both telecommuting and client and service connections into the residential community. At the same time, it will be equally important to balance competitive infrastructure development with necessary City objectives related to proactive management of the ROW (as discussed in Appendix 3) and wireless infrastructure placement oversight (as discussed in Appendix 4).

4. Some businesses in Rockville expressed an interest in developing a community videoconferencing/telecommunications center at City Hall so that the cost of access to such services could be effectively shared across a number of business and community users.

Recommendation: The City should explore the development of such a center at City Hall, another public facility, an educational facility or, through a cooperative partnership, at a Rockville business location. This exploration should include a further look at the number and types of users and uses that would be enabled by such a center in relation to its cost of development.

In summary, the City should use the data gathered in support of the current Telecommunications Policy and Plan development effort as a spring board to implement the recommendations described above, as well as continue to explore in an ongoing manner the telecommunications service and technology needs of the Rockville business community.

Business/Organizational Telecommunications Needs Assessment Survey
Mark-up
(N=27)

1. Organization:
    1. Little Homestead Furniture
    2. PC Warehouse
    3. Great Harvest Bread
    4. Congressional Aquarium
    5. Danzansky Goldberg Mem. Chapel
    6. Spectro Assoc., Inc.
    7. Pearle Express
    8. India Grill
    9. Triple C Travel
    10. Chiropractic Centre of Hungerford
    11. The Olive Branch
    12. Grand Bank
    13. Auto Sound Systems, Inc.
    14. Twinbrook Deli
    15. Nedley & Company
    16. Just Tires
    17. Yankee Clipper
    18. Courtesy Cleaner
    19. The Alexander School
    20. Suburban Federal Savings Bank
    21. Defense Research Tech., Inc.
    22. Loft Bed Store
    23. Mail Boxes Etc.
    24. Aspen Systems Corp.
    25. Witmer Associates, LLC
    26. Trizec Hahn

2. Department: All respondents were either Presidents, Owners, Managers or Division Managers

3. Number of employees in Rockville office(s): Range: 1-1000, Mode=3

4. Person responding to survey: Not reported on mark-up.

5. List any satellite or field offices of your organization:
   Grand Bank: Three Satellite Offices
   Nedley & Company: S. S. MD

6. Briefly describe what your organization does:
   Sell Furniture
   Retail & Integrated Computer Systems
   Make & Sell Bread
   Retail Business - Aquariums
   Funeral Home
   Manufacturers' Rep.
   Sell & Prescribe glasses & contacts
   Restaurant
   Travel & Tours
   Healthcare & Chiropractic
   Retail Book Store
   Bank/Financial institution
   Installers - telephones, alarms, C.B. radios
   Beer, Wine, Carryout, Deli
   Retailer
   Retail Tire sales
   Barber
   Dry Cleaner
   Tutoring, Private music lessons, ESL (English as a Second Language)
   Research & Development
   Retail Furniture
   Postal, Business & Comm. services
   Information Management services
   Development Consultants
   Commercial Property Management

Telephone Service

7. Who is your local telephone service provider?
   Bell Atlantic 100%

8. On a scale of 1 to 5, with **1 being unacceptable** and **5 being excellent**, please rate each of the following aspects of local telephone service within the last two years or indicate "N/A" if not applicable.

4.2	Sound quality	3.3	Billing practices	3.7	Installation
3.6	Repair service	2.6	Prices	4.1	System reliability

9. Using the same 1 (unacceptable) to 5 (excellent) scale, how would you rate your local telephone company's overall customer service? *(Customer service means installation, repair, billing and responsiveness, but not price.)* 3.6

10. Has the local telephone company been responsive to service problems?

33.3	Very responsive	7.4	Somewhat responsive	14.8	Never had a service problem
29.6	Responsive	3.7	Not at all responsive	11.1	Don't know

11. If you called for service, how soon after your call was the problem resolved?

1 day 33.3 2 days 29.6 3 days or more 11.1 Never needed service 25.9

12a. Do you presently have multiple telephone lines? Have 84.6 Don't have 15.4

12b. If not, are you considering getting multiple telephone lines?

Want 14.3 Don't want 85.7

For what purpose:

Data/FAX/Internet

13. On average, how much is your monthly local telephone bill? *(Rounded to the nearest dollar)*

Range: $20-$10,000, Mode: $600

14. How would you rate the prices charged by your local telephone company for business telephone service?

33.3	Very high	11.1	Right amount	0.0	Very low
51.9	Somewhat high	0.0	Somewhat low	3.7	Don't know

15. Would you be likely to change to another local telephone service if it were available to you?

Yes 65.2 No 34.8

16a. Do employees of your organization currently use cellular telephones in the conduct of your business?

Yes 37.0 No 63.0

16b. If yes, how valuable is cellular service to your organization?

38.5	Very valuable	23.1	Somewhat valuable	7.7	Don't know
15.4	Valuable	15.4	Not Valuable		

17. Besides the company listed in your response to Question 7, please list any communications service providers you have for local loop services.

Unisys	3.7
Nextel, Pagenet, AT&T	3.7

If you have any other comments regarding your telephone service, please include them here:

1. Do not like local & long distance billed together. Would like them billed separately.
2. Slamming - Bell Atlantic should not allow any long distance carriers changes without pre-authorization/verification.
3. Poor customer service.
4. Charges for installation, connecting are too high.

Other Voice, Data and Video Communications

18. Please check which of the following communications methods you currently use or need to begin using in the near future.

Current	Future		Current	Future	
74.1	11.1	Fax	40.7	7.4	Workstation or PC Networking
40.7	25.9	E-Mail	11.1	18.5	Electronic Data Interchange (EDI)
37.0	25.9	Internet	11.1	14.8	Telecommuting (PC connection from
11.1	0.0	Intranet			home to office)
0.0	0.0	E-Commerce	25.9	14.8	Document scanning
25.9	3.7	Voicemail	0.0	22.2	Videoconferencing
29.6	7.4	Audio Conferencing	3.7	3.7	Teletraining or other Video
14.8	7.4	Automated Telephone			Distribution
		Response	3.7	3.7	Cable Television
14.8	3.7	Paging Service	3.7	7.4	Satellite/Microwave Signal Reception
0.0	0.0	Other **(specify)**	3.7	14.8	Internet Telephone Service

19. For each communication method checked above, **briefly describe** its major uses by your organization. Please also describe any problems you've encountered with the use of these applications.

Type	Current Use	Future Use	Problems Encountered
Fax	Order Processing/ Quotes 11.1 Store to Store 3.7 Send & Receive Reports 3.7	Order Processing 3.7	Quality 3.7 Paper Jam 3.7 Fax Machine 3.7
E-Mail	Orders 3.7 Customer 3.7 In-Store/ In-House 3.7	Orders 3.7 Customer 3.7 Documents 3.7	Interruptions 3.7 Use 3.7

Type	Current Use	Future Use	Problems Encountered
Internet	Information/ Research 11.1 Website 3.7 In-Store 3.7	Website 3.7 Information/ Research 3.7 Retail 3.7	Connection 3.7
Intranet	--	E-mail 3.7	Maintaining Content 3.7
E-Commerce	--	--	--
Voicemail	Service 3.7 Messages 3.7 Retail 3.7	Messaging 3.7	--
Audio Conferencing	Meetings 7.4 Business Comm. 3.7	Discussion 3.7	--
Automated Telephone Response	Customer Inquiries 3.7	In-House 3.7	Design 3.7
Paging Service	Contact 3.7	Messaging 3.7	--
Workstation or PC Networking	Graphics 3.7 Information/ Research 3.7 Daily Ops 3.7	Graphics 3.7 Information/ Research 3.7 In-Store 3.7	Speed 3.7 Wiring in space 3.7 Cost 3.7
Electronic Data Interchange (EDI)	--	Modem 3.7	--
Telecommuting	--	Working at home 3.7 Work 3.7 Retail 3.7	Management 3.7
Document Scanning	Training 3.7 Retail 3.7	Document Storage 3.7	Speed (too slow) 3.7
Videoconferencing	--	Discussion 3.7 Work 3.7 Retail 3.7	--
Teletraining or Other Video Distribution	Training 3.7	Training 3.7	--

Type	Current Use	Future Use	Problems Encountered
Cable Television	--	Information 3.7	--
Satellite/Microwave Signal Reception	--	Internet Connection 3.7	--
Internet Telephone Service	--	Saving Money 3.7	Time lag 3.7
Other **(specify)**	--	--	--

20. How do you provide the bulk of your services and/or information to your primary customers (general public, businesses, professionals, other organizations, institutions, students, patients, etc.)? **Please estimate percentages.** (Except where noted the mean is presented first, followed by the mode in parentheses)

61 (50)	In-person contact	1.5 (1)	Other computer communication
36 (50)	Phone	5.4 (5)	Fax
0.0	Video	31.0 (N=1)	Imaging
13.4 (5)	Internet	6.6 (5)	Written correspondence or other hard copy

0.0 Other **(specify)**

21. List facilities/organizations or segments of the community (residential, educational, etc.) with whom you regularly communicate. If you are currently connected to these locations via a computer or video system in addition to the telephone, or need to use such in the future, please also **briefly describe** the system.

Facilities/Organizations/ Community Segments With Whom You Regularly Communicate	Computer Connection (if applicable)		Video Connection (if applicable)	
	Current	Future	Current	Future
1. Physicians Office 2. Insurance Companies 3. Federal government agencies. 4. General Public 5. Aspen Facilities 6. Department of Labor		11.1	11.1	3.7

22. List other facilities/organizations or segments of the community with whom you will need or want to communicate in the future. Please also briefly indicate why you need this type of communication and check whether you need a video and/or computer connection in addition to telephone.

Future Facility/ Organization/Community Segment Connections	**Reason**	**Computer**	**Video**
1. Public Schools 2. Embassies 3. Professionals 4. General Public 5. Vendors 6. Regulatory Agencies	1. Marketing 2. Retail 3. Purchasing 4. Design Review	7.4	3.7

23. Which of the following types of services are you most interested in seeing the City provide interactively on line?
    - 22.2 General information and responses to questions about City services
    - 7.4 Forms
    - 14.8 Permits (building, etc.)
    - 11.1 Surveys
    - 7.4 Other *(Specify)*: Calendar of Events, Demographics
    - 55.6 Don't know

Overall Concerns

24. Please rank, in order of importance to you, the following list of needs and concerns regarding the future telecommunications environment (1 being of highest concern, 10 being of lowest concern; **use each ranking only once**). (The mean is presented first, followed by the mode in parentheses)

2.6 (1)	Reducing telecommunications cost
8.0 (2)	Faster/greater computer communications
4.5 (10)	Establishing/increasing Internet access
6.0 (6)	Establishing network capacity for additional end users at your organization
4.3 (5)	Increasing reliability/availability of current systems
5.2 (2)	Increasing availability of redundant or back-up networks
5.9 (7)	Placement of below and above ground telecommunications facilities (conduits, satellite dishes, communications antenna towers, pedestals, etc.)
6.5 (9)	Resolving difficulties in the areas of zoning, permitting, right-of-way access or easement acquisition as they relate to the placement of telecommunications facilities
5.7 (4)	Establishing more point-to-point (i.e., facility to facility) circuits
6.0 (3)	Establishing more peer-to-peer (i.e., desktop to desktop) circuits

25. Overall, what is the most critical short term and long term communications need of your organization?

Short Term	**Long Term**
1. High Speed Internet Connection	1. High Speed Internet Connection
2. Cheaper Phone Service/cost	2. Cheaper Phone Service/Cost
3. Computers	3. Computers
4. Customer Access	4. Internet setup
5. Installation w/o excessive fees/permits	5. Internet Commerce
6. Managing volume	6. Provide Customer with comm. needs
7. Planning/requirements	7. Integrated systems
8. Education on options	
9. Voicemail	

26. Does your organization have a World Wide Web site? Yes 44.4 No 56.0
    The address?

Survey #	Web Address
1.	www.littlehomestead.com
2.	www.pcwarehouse1.com
7.	www.spectrosales.com
8.	www.pearlevision.com
13.	www.grandbank-online.com
21.	www.suburbanfsb.com
23.	www.loft.com
24.	www.mbe.com
25.	www.aspensys.com

27. Any other comments?
    I don't think this applies to us. (regarding data communications section)
    Thanks.

Appendix 12

Overview of the Competitive Telecommunications Climate in Rockville

As can be seen from the information presented in the other Appendices to the City of Rockville Telecommunications Policy and Plan, there is a keen interest in, and a need for competition, in all phases of telecommunications services to address the needs and concerns of the Rockville residential, institutional, business and other organizational Communities of Interest ("Communities"). As also can be seen from information in other Appendices, there is a competitive climate in Rockville that should continue to advance, especially with proactive involvement from the City.

To summarize, specifically regarding telephone communications, the cost of telephone services is a significant concern of all Communities, and current service options are concerns of high-end users and those beginning to pursue advanced services. From available information, it appears that the Incumbent Local Exchange Carrier (ILEC), Bell Atlantic, continues to provide the majority of telephone service connectivity to residential, organizational and commercial users. Change is forecast though, as companies like Starpower have stated their intent to build a full service, City-wide network that would provide facilities-based residential telephone services. Additionally, MCI currently has backbone infrastructure ringing the City and appears to be awaiting favorable interconnection agreements with Bell Atlantic before pursuing residential service. Such agreements may be forthcoming in a faster fashion, depending upon the outcome of judicial proceedings this Spring before the U.S. Supreme Court. This could also conceivably affect the roll-out of services from others in the group of over forty Competitive Local Exchange Carriers (CLECs) to the residential community, either as resellers or as facilities based carriers.

Similarly, the expansion of telecommunications services designed to facilitate data communications is somewhat inhibited, especially in the residential market, by the relatively slow pace of competitive infrastructure development. This situation is starting to experience some change, especially in the business sector with at least two current competitors (MCI and MFN) to Bell Atlantic, others focusing on the residential and business marketplace (CTM and Starpower), and others currently expressing an interest (i.e., HNI, KMC, etc.) in developing infrastructure. Additionally, service providers for Digital Subscriber Line (DSL) services, such as Covad, are beginning to market their services through current connection agreements with Bell Atlantic. Further, Bell Atlantic is beginning to roll out its Infospeed DSL service in the Washington Metropolitan area. In the past, ILECs have been slow to roll out DSL services reportedly because it could take away from other traditional revenue streams (such as T-1 services). Additionally, DSL may reduce the need for a second phone line (since voice and data services can be integrated with DSL technology) at residences, thus reducing that potential revenue stream. However, as competition from alternative DSL providers and cable system based data-over-cable modem service providers continues to increase, it should move ILEC's DSL offerings to the forefront, thus benefiting both residential and business consumers.

Whatever the ultimate outcome of judicial proceedings and the changing status of current or anticipated competitors, the City should pursue all available avenues to increase the nature and type of competition, since it has proven beneficial in areas where it has emerged in both lowering prices and increasing service diversity. To the extent the

current and anticipated competitive climate can be accelerated through proactive involvement by the City, such acceleration will move to meet the needs accessed during this Telecommunications Policy and Plan development project.

Regarding wireless communications, the City currently has two active cellular providers and at least three active PCS providers, based on known infrastructure placement and general marketing activity. The City should anticipate additional wireless infrastructure and services, as others that have been granted spectrum rights, move to join the competitive fray. The progress of competition in the wireless market, which has seen service levels increase and service prices decrease dramatically over the last two years is a good indicator of what aggressive, local wireline phone and data communications competition could hold in store for consumers. The City has also seen the rollout of wireless data communications services from Metricom and may see additional wireless data communications providers emerge as the capabilities of such technologies continue to increase.

Regarding video communications, CTM should continue to see a greater degree of competition over the next several years. This is anticipated to come from both wireline providers such as Starpower, as well as wireless providers such as DirecTV now that direct satellite service providers have developed new and better local off-air television reception technology, as well as formidable marketing alliances with local exchange carriers. This, plus continuing development of digital video delivery systems, should mean increasing services and better prices for consumers over time. Regarding video services for businesses such as videoconferencing, it is likely that enhanced competition in both the wireless and wireline telecommunications services arena will provide increased delivery of digital video either directly or through the Internet for business use in the next several years.

Concerning video competition, the City has significant authority over wireline providers of video services and should employ such where necessary to continue to enhance the competitive video service delivery climate concerning business video services. Proactive involvement in promoting overall telecommunications services competition will enhance the availability of business video service options. Additionally, as noted in an earlier Appendix, the City may proactively want to establish or encourage establishment videoconferencing center capabilities for use by small businesses.

Overall, the competitive forecast for the City, while there are still many unknowns, looks favorable related to an increase in competition over time, especially as the City may be proactively involved in the promotion of such increased competition.

TELECOMMUNICATIONS GLOSSARY

TELECOMMUNICATIONS GLOSSARY

ANALOG SIGNAL: Signal in a form based upon its natural state of combination of frequencies of different amplitude.

ATM: Asynchronous Transfer Mode; a packetized digital transfer system.

BER: Bit Error Rate; number of erroneous bits of data divided by number of bits sent; 1 x 10^{-6} = one erroneous bit out of 1,000,000 bits.

BIT: BInary digi**T**; Smallest unit of information of a digital signal; represented by "1"s and "0"s; also "highs" and "lows".

bps: Bits per second; digital transmission; "b" of bits is written in lower case to distinguish it from Bytes.

BRIDGE: A data communications device that connects two separate networks, each using the same communications method.

BYTE: Combination of bits needed to represent an identifiable portion of a digital signal for transmission or storage; 1 Byte = 8 bits.

CATV: Community Antenna Television System; now just called a Cable Television System.

CDMA: Code Division Multiple Access; form of transmitting digital signals.

CDPD: Cellular Digital Packet Data; transmission of packetized data during idle time in the analog cellular telephone system.

CELLULAR TELEPHONY: Mobile radio service in which a geographic area is divided into smaller areas known as cells. Transmitters and receivers in each cell provide radio coverage to the users in the cell. Calls are handed off from one set of transmitters and receivers to another set of transmitters and receivers in another cell as the user moves between cells.

CENTRAL OFFICE: Location within a telephone network (usually within three to five miles of a home or business) to which transmission lines (usually copper pair wires) go and where the signals are switched, processed, and interconnected to other Central Offices and long distance facilities.

CMRS: Commercial Mobile Radio Service; FCC regulatory classification for mobile telephone service combining cellular, SMR/ESMR, and PCS.

CODEC: CODer - **DEC**oder; **CO**mpression - **DEC**ompression; basically, the device that converts signals between analog and digital and/or also provides for compressing and decompressing the signals while in a digital state.

CPE: Customer **P**remise **E**quipment.

CSMA: Carrier Sense Multiple Access; a transmission protocol that allows multiple users by sensing when a channel is quiet before transmitting.

DAB: Digital Audio Broadcasting; audio broadcasts in digital form using terrestrial, satellite, or hybrid transmissions.

DARK FIBER: An optical fiber not carrying signals.

dB: Decibel, a logarithmic representation of a ratio; often used to describe very large numbers in a simplified notation.

DBS: Direct Broadcast Satellite; medium to high power satellites transmitting programming in the Ku Band directly to small satellite receiver dishes at users' homes.

DIGITAL COMPRESSION: Altering a digital signal so the most important parts can be transmitted and/or stored in less spectrum space.

DIGITAL SIGNAL: Signals in a form based upon "1"s and "0"s; signals changed from analog by sampling at various points throughout the signal.

DOWNLINK: In satellite communications, the signal that travels from the satellite down to the receivers on earth.

DSL: Digital Subscriber Line; Telephony term for digital service to the home over regular telephone company copper pair wire; service would potentially provide High-speed Internet Access and/or one or more television programming channels by using compressed video technology.

DOWNSTREAM: In Cable Television systems, transmission in the direction from the headend towards subscribers.

DS-3: Digital Service, level three; a digital transmission service operating at 44.736 Mbps.

ESMR: Enhanced Specialized Mobile Radio; next generation of SMRs using digital technology combined with cellular system architecture.

ESN: Electronic Serial Number; number encoded in each cellular radio that uniquely identifies each cellular telephone manufactured.

ETHERNET: A networking standard developed along IEEE Specification 802.3, including 10 Mbps (10 base T) and 100 Mbps (100 base T) implementation.

FDDI: Fiber Distributed Data Interface; high-rate fiber-optic data transfer standard for up to 100 Megabits/second (100 Mbps).

FDMA: Frequency Division Multiple Access; allows multiple users of the same channel by carrying each user on different frequencies.

FIBER OPTIC CABLE: Several optical fibers within an outer jacket; cables with 48, 108, 144 and 216 optical fibers are common today.

FRAME RELAY: A type of data transfer system; an advanced form of packet switching.

GATEWAY: A data communications device that connects two separate networks, each using different communications methods.

GIGA: Prefix multiplier of one billion; 10^9; 1,000,000,000; abbreviated as G; 1 GHz = 1,000 MHz = 1,000,000 KHz = 1,000,000,000 Hertz.

GIS: Geographic **I**nformation **S**ystem or **S**ervices.

GPS: Global Positioning System; network of satellites that provides location determination to receivers.

HDTV: High **D**efinition **T**ele**V**ision; television transmission standards replacing the NTSC standards to provide increased performance; several different sets of standards exist in the world, including both analog and digital signal methodologies.

HEADEND: Location within a Cable Television system where signals are received and processed for distribution to subscribers.

HERTZ: Measure of frequency; for the most part, what used to be called "cycles per second".

HFC: Hybrid Fiber Coax; a cable/telecommunications architecture utilizing fiber optics as the distribution trunk and converting to coaxial cable at a node for distribution to a neighborhood (250 homes or more) or one or more facilities.

INTERNET: Large collection of interconnected computer networks that use a common transmission protocol (TCP/IP).

INTRANET: A term for small and secure private "Internet Type" systems; much like wide area networks (WANs) with increased operability.

ISDN: Integrated Services Digital Network; local telephone company service to send data in multiples of 64 kbps circuits over copper wires; the basic ISDN service contains a minimum of two 64 kbps circuits.

ISP: Internet Service Provider.

ITFS: Instructional Television Fixed Service; point to multipoint microwave service operating at about 2500 MHz; now, more commonly known as MMDS or Wireless Cable.

KILO: Prefix multiplier of 1000; 10^3; abbreviated K; 1 KHz = 1000 Hertz.

Ku BAND: Portion of the electromagnetic spectrum used for satellite transmission using frequencies from about 10 GHz to 13 GHz.

LAN: Local Area Network.

LATA: Local Access and Transport Area; local exchange areas within which the local telephone company may provide service.

LEC: Local Exchange Carrier; a local telephone company; over a thousand LECs, ranging in size from very small independent telephone companies that serve rural areas to much larger Bell Operating Companies.

MAN: Metropolitan Area Network.

MEGA: Prefix multiplier of one million; 10^6; 1,000,000; 1 MHz = 1000 KHz = 1,000,000 Hertz.

MICRO: Prefix multiplier of one millionth; 10^{-6}; 1/1,000,000; abbreviated as μ; 1,000,000 microseconds = 1,000,000 μsec = 1 second.

MICROWAVE: Radio frequency spectrum signals between 890 MHz and 20 GHz; point-to-point microwave transmission is commonly used as a substitute for copper, coaxial, or fiber cable.

MILLI: Prefix multiplier one thousandth; 10^{-3}; 1/1000; abbreviated as lower case m; 1000 milliseconds = 1000 msec = 1 second.

MMDS: Multi-Channel Multi-Point Distribution Service; high power microwave distribution system broadcasting up to 33 analog channels to homes and businesses; outgrowth of ITFS; also known as Wireless Cable.

MODEM: MOdulator/**DEM**odulator; device to change digital signals to analog signals for transmission on regular home telephone copper pair wires or coaxial cable and back

to digital at the other end; definition becoming blurred as various compression methods are developed.

MODULATION: Process of encoding information onto a radio wave (carrier) by varying one of its basic characteristics (amplitude, frequency or phase) in relation to an input signal such as speech, music, video or data; two of the most common types of modulation are amplitude modulation (AM) and frequency modulation (FM).

MULTIMODE: A type of optical fiber; larger and less efficient than single mode optical fiber.

NANO: Prefix multiplier of one billionth; 10^{-9}; 1/1,000,000,000; abbreviated as lower case n; 1,000,000,000 nanoseconds = 1,000,000,000 nsec = 1 second.

NODE: A point of connection in a network; e.g., a fiber optic node in Cable Television systems is the point where light signals carried on fiber optic cable are converted to electrical signals for carriage on coaxial cable.

NTSC: National Television Systems Committee; established the NTSC standard for black and white television in 1940 and color television in the early 1950s.

OC-1: Basic optical carrier rate of 51.84 Mbps. Other rates (such as OC-3) are multipliers of the basic rate.

OPTICAL FIBER: A transmission medium consisting of a core of glass or plastic surrounded by a protective cladding, strengthening material and outer jacket; two types are single mode and multimode; signals are transmitted as light pulses, introduced into the fiber by a light transmitter (either a laser or light emitting diode).

OVS: Open Video System; a new type of transmission system similar to a Cable Television system; replaced Video Dialtone systems.

PABX: Private Automatic Branch Exchange.

PBX: Private Branch Exchange.

PCN: Personal Communications Network.

PCS: Personal Communications Service (or System); family of radio communication services providing mobile and incidental fixed services for voice and data applications.

PICO: Prefix multiplier of one trillionth; 10^{-12}; 1/1,000,000,000,000; abbreviated as p; 1 picosecond = 1 psec = 1/1,000,000,000,000 second.

POP: Point of Presence; a point of interconnection between the facilities of separate telecommunications service providers.

POTS: Plain Old Telephone Service; the basic service supplying standard single line telephones, telephone lines and access to the public switched network.

PRI: Primary Rate Interface; a high-speed ISDN circuit equivalent to a T-1.

PSTN: Public Switched Telephone Network; the publicly accessible dial-up telephone network.

ROUTER: A data communications device similar to a bridge, but can also find the best route between networks.

SINGLE MODE: A type of optical fiber; more efficient than multimode optical fiber for traveling longer distances without repeaters, but is more expensive to make and for the terminal equipment needed to use it.

SONET: Synchronous **O**ptical **NET**work; family of fiber optic transmission rates from 51.84 Mbps to 13.22 Gbps.

SMR: Specialized Mobile Radio; established in 1974 to provide dispatch service to trucking, taxi and similar industries, government entities, and to individuals on a for-profit basis.

SPECTRUM: All the radio frequencies that are used for radio communications; also called Electromagnetic Spectrum.

SPREAD SPECTRUM: Spread Spectrum Modulation uses a wide band of frequencies to send radio signals; signal is spread across a wider range of frequencies instead of transmitting a signal on one channel.

T-1: Digital data transmission rate of about 1.54 Mbps; normally can handle 24 voice channels digitized to 64 kbps each; can be carried on two pair of copper pair wires or coaxial cable to homes and businesses.

T-3: Digital data transmission rate of 44.736 Mbps; commonly referred to as 45 Mbps; handles 28 T-1 lines.

T-CHANNELS: Upstream television transmission channels on a cable television system operating in the 5 to 30 MHz and 5 to 40 MHz region.

TCP/IP: Transmission Control Protocol/Internet Protocol; set of protocols to link dissimilar computers, as in the Internet.

TERA: Prefix multiplier of one trillion; 10^{12}; 1,000,000,000,000; abbreviated as T; 1 TB = 1000 GB = 1,000,000 MB.

UPLINK: In satellite communications, the signal that travels from the Earth transmitting station up to the satellite.

UPS: Uninterruptible Power Supply.

UPSTREAM: Transmission from the direction of subscribers towards the headend.

WAN: Wide Area Network.

WAVELENGTH: Basically, the speed of light divided by the frequency of a signal; also described as the distance between peaks of an electromagnetic wave.

WDM: Wavelength Division Multiplexing; a way to increase the capacity of an optical fiber by simultaneously operating at more than one wavelength of light.

WIRELESS CABLE: High power microwave distribution system broadcasting up to 33 analog channels to homes and businesses; outgrowth of ITFS, also known as MMDS.

Note: A number of the definitions for this glossary were used by permission of Bill Pohts, Consulting Engineer.